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THE EXCAVATING ENGINEER PUBLISHING COMPANY

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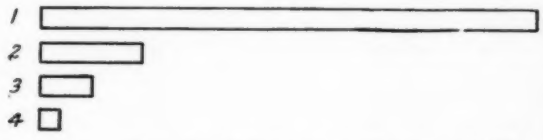
Looking South Toward Pedro Mignel Locks, Panama Canal.—Concrete work in the lock at Pedro Miguel is over 98 per cent completed, 876,856 cubic yards, out of a total of 889,827, bucket measurement, having been placed at the close of work on September 7.—Courtesy of Fitz J. Lewis.

The Added Excavation Due to Earth Slides in Culebra Cut, Panama Canal

THERE was removed from slides and breaks in the Culebra Cut section of the Central Division during the twelve months ending June 30, 1912, a total of 5,915,000 cubic yards of material, which is the greatest amount taken out on this account in any one year since the beginning of operations. A statement showing the total excavation, the amount removed from slides and breaks, and the percentage involved in the slides and breaks, is given below. There is also presented a graphical illustration showing the total estimated excavation on account of slides, as compared with the original total of excavation in the Canal prism in the Culebra Cut section; also the estimate of total excavation remaining on July 1, 1912, showing the amount of excavation remaining on that date due to slides:



No. 1 represents the total amount of material excavated from the Canal prism in the Culebra Cut section by the Americans, exclusive of slides, to July 1, 1912.

No. 2 represents the total amount of material excavated from slides from the Culebra Cut section by the Amerians up to July 1, 1912.

No. 3 represents the material remaining to be excavated from the Canal prism in the Culebra Cut section, exclusive of all slides, from July 1, 1912.

No. 4 represents the material in slides on the banks of the Canal in the Culebra Cut section, remaining to be excavated according to estimate made as of July 1, 1912.

The first large slide to occur in the banks of the Canal in the Culebra Cut section was that at Cucaracha, known as the Cucaracha slide, which developed in July, 1905, and from which nearly 3,000,000 cubic yards of material have been excavated to date. During the twelvemonth period ending June 30, 1912, only 170,000 cubic yards of material were removed from this slide, which, at present, gives no evidence of any future considerable movement. it covers an area of 47.1 acres.

The most extensive slide, or rather break, is that on the west bank of the Canal at Culebra, which extends practically continuously from Station 1726 to Station 1804, covers an area of 63 acres, and has now broken back to a point where the site of the Culebra clubhouse is involved. From this area, a total of 6,765,500 cubic yards of material had been removed up to June 30, 1912, and it is estimated that 1,300,000 cubic yards remained to be excavated on that date. A total of 2,710,000 cubic yards was taken out from the area involved in this slide during the twelvemonth ending June 30, 1912. It first developed in January ,1907.

The slide next largest in extent is situated on the east bank of Culebra Cut directly opposite the one on the west bank, is practically continuous from Station 1741 to Station 1796, and covers an area of 50.7 acres. A total of 4,290,000 cubic yards of material had been removed from this slide up to June 30, 1912, and approximately 600,000 cubic yards remained to be removed on that date. It first developed in January, 1907.

The three slides above described are the only ones which have so far developed in which the total amount of material involved exceeded 1,000,000 cubic yards. A table showing the slides in the Central Division, which had developed up to June 30, 1912, all of which are confined to the Culebra Cut section is given on the next page.

Since June 30, 1912, two or three other slides have developed, the most important being the break in the east bank of the cut about one-half mile north of Empire, which occured on August 20, and allowed the water in the Obispo Diversion to flow into the cut, and another break in the west bank at Culebra.

The work of descreasing the pressure where breaks and slides might be expected, by excavation with steam shovels, has continued uninterruptedly since January, 1911. Three shovels have been kept continuously at work terracing the west bank at Culebra, and the same number were occupied during the latter part of 1911 on the opposite bank.

Ficsal Years.	Total excavation.	Removed from slides.	Percent of total amount removed from slides.
	Cubic Yards.	*Cubic Yards.*	
1904-1909.....	40,983,366	3,227,059	7.87
1910.....	17,865,808	2,649,563	14.83
1911.....	18,552,644	4,879,378	26.30
1912.....	17,143,067	5,915,000	34.50
Total.....	94,544,885	16,671,000	17.63

The excavation has been made in each locality in a series of nine terraces. In addition, one shovel

has been engaged in similar work at the Whitehouse yard, and another on the east bank, a little south of the Empire suspension bridge. The maximum depth of material removed at one spot in the west bank at Culebra was 80 feet, measured vertically, and on the east bank 70 feet in one place.

The record shows that while the lightening of weight has, on the whole, been beneficial, it has not wholly stopped the moving and heaving. The results obtained so far, however, warrant a continuance of this work, and it will probably be prosecuted until all excavation in the cut by steam shovels has been completed. Most of the socalled slides during the past year, or more, were, properly speaking, breaks in the banks of the cut, due to the inability of an underlying layer of rock of poor quality to support the enornous pressure superinduced by the weight above it. This weight crushes the underlying material, forces it laterally, and causes it to heave in the bottom of the Cut. Observations made show that the material at times has heaved to a height of 30 feet, but within the past year, or more, 15 or 20 feet has been about the maximum height. Other observations made of these upheavals go to show that the material involved is not clay or stiff mud, as is commonly supposed, but rather argillaceous sandstone in pieces ranging in volume from a few cubic inches to 20 or 30 cubic yards, with an average perhaps of from one to three cubic yards.

LOCATION	Date of development.	Removed year ending July 1, 1912.	Material excavated to date.	Material remaining	Area of slide in acres.
		Cubic Yards.	*Cubic Yards.*	*Cubic Yards.*	
East side, opposite Bas Obispo	Sept., 1910	6,000	117,000	70,000	2.80
East side, opposite Haut Obispo	Sept., 1908	.....	18,000	.....	0.60
West side, opposite Buenavista	Nov., 1908	119,000	162,000	.....	3.30
East side, opposite Las Cascadas	Feb., 1908	2,000	503,000	.....	11.50
East side, opposite Las Cascadas	Sept., 1909	80,000	102,000	20,000	1.40
East side, opposite Whitehouse	Oct., 1908	.....	286,000	.....	4.60
West side, Whitehouse yard	June, 1912	.....	.....	130,000	1.00
East side, opposite Whitehouse	Oct., 1909	195,000	413,000	180,000	5.80
East side, Upper La Pita	Dec., 1909	.....	20,000	.....	1.70
East side, Lower La Pita	May, 1910	.....	30,000	50,000	0.30
West side, Cunette	Sept., 1910	4,000	67,000	10,000	0.90
West side, Empire	May, 1910	165,000	210,000	50,000	2.20
West side, Culebra	Oct., 1907	2,710,000	6,765,000	1,300,000	63.00
East side, Culebra	Jan., 1907	1,960,000	4,290,000	600,000	50.70
Cucaracha	July, 1905	170,000	2,890,000	230,000	47.10
West side, Contractor's Hill	1908	5,000	216,000	15,000	2.00
East side, Cucaracha village	Sept., 1911	57,000	57,000	160,000	3.40
East side, Paraiso	Mar., 1907	62,000	385,000	10,000	5.70
Small slides	.....	380,000	140,000	770,000	.....
Total	.....	5,915,000	16,671,000	3,595,000	208.00

Canal Work in August.

The grand total of Canal excavation to September 1, was 178,344,405 cubic yards, leaving to be excavated 33,882,595 cubic yards, or a little over one-fifth of the entire amount necessary for the completed Canal. The total excavation for the month of August was 2,443,353 cubic yards, as compared with 2,706,223 cubic yards in August, 1911.

The dry excavation amounted to 1,356,625 cubic yards, and was principally by steam shovels. The dredges removed 955,617 cubic yards from the Canal prism, and 131,111 cubic yards from the site of the Balboa terminals, in addition to the amount pumped into Gatun Dam by suction dredges. The progress on the locks at Gatun, Pedro Miguel and Miraflores is referred to elsewhere in this issue.

In the Atlantic Division, the total excavation was 515,947 cubic yards. Of this total, 1,974 cubic yards, consisted of dry excavation near the Locks, and the remainder was wet excavation—429,415 cubic yards from the Atlantic entrance, and 84,558 cubic yards between the locks and the sea.

The total excavation in the Central Division was 1,094,132 cubic yards, 1,067,300 cubic yards from the Culebra Cut section, and 26,832 cubic yards from the Obispo Diversion.

In the Pacific Division, the total excavation was 833,274 cubic yards, 260,519 cubic yards of which, consisted of dry excavation, 183,570 cubic yards from the Canal prism, 64,963 cubic yards from the terminal site, and the remainder near the locks. Of the 572,755 cubic yards of wet excavation, 441,644 cubic yards were from the channel, while the remainder was in connection with the terminal work.

Work of Central Division Machines During the Month of August.

During the month of August, the total amount of material excavated in the Central Division was 1,094,132 cubic yards, of which 197,597 cubic yards were classified as earth, and 896,535 cubic yards as rock.

The entire total of 1,094,132 cubic yards was removed by steam shovels.

The high record for the month was made by shovel No. 217 a 95 ton Bucyrus, working 27 days in the Culebra district, which excavated 49,157 cubic yards of rock.

The second best record for the month was made by shovel No. 212 a 95 ton Bucyrus, working 27 days in the Culebra district, which excavated 44,713 cubic yards of rock.

The best record for a shovel of the 70-ton class was made by shovel No. 109 a 70 ton Bucyrus, working 27 days in the Culebra district, which excavated 41,793 cubic yards of earth.

Shovel No. 229 a 95 ton Bucyrus, working in the Culebra district, made a high record for one day by excavating 3,021 cubic yards of rock on August 1.

Except where noted, monthly reports are computed by place measurement, while the daily reports are based on car measurement. The best records for the month, and for one day, are shown in the following table:

Best Records for the Month

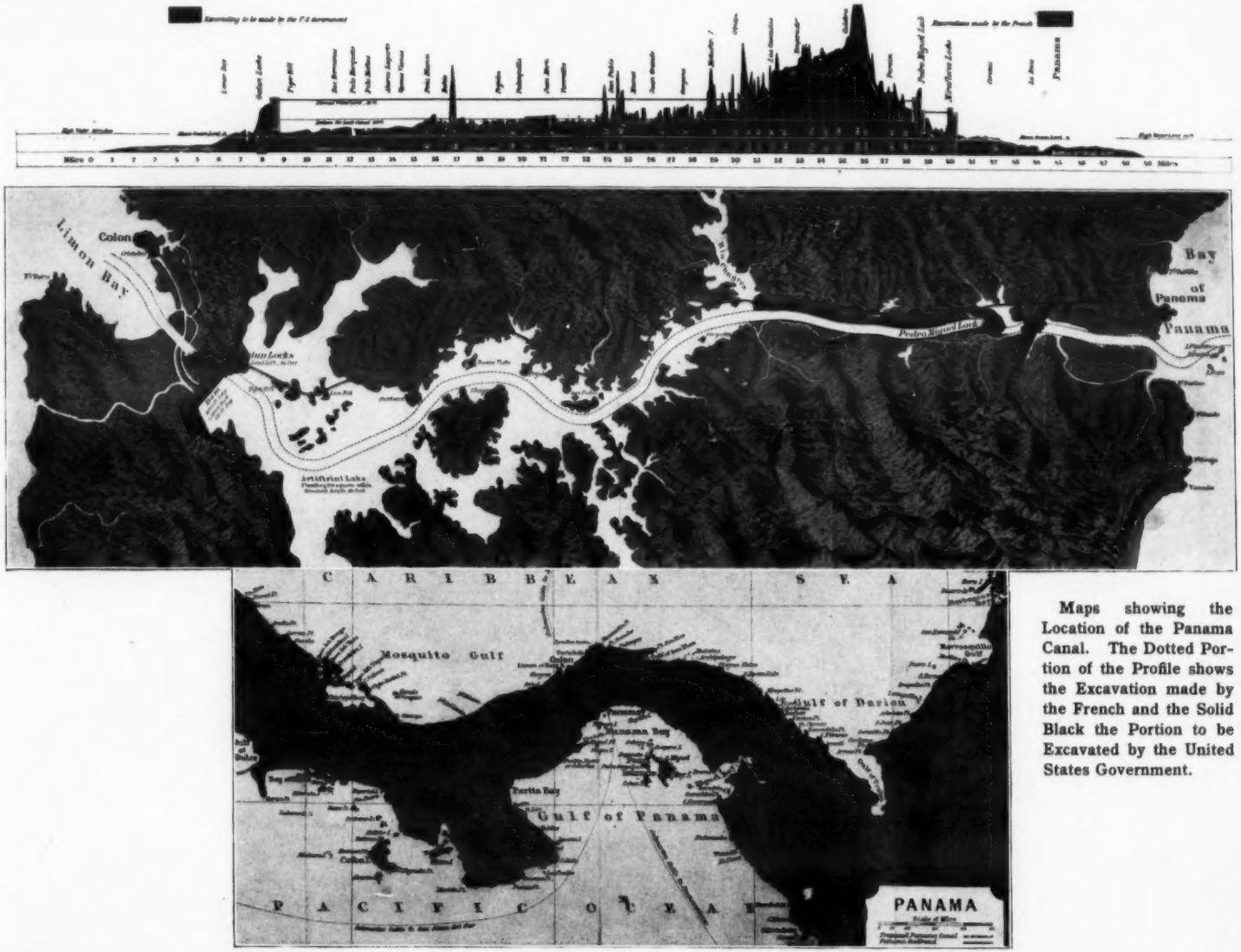
All Bucyrus Shovels except as noted.

Shovel No.	Cubic Yards.			
	Earth.	Rock.	Total.	No. of days at work.
CULEBRA DISTRICT				
217	.....	49,157	49,157	27
212	.....	44,713	44,713	24½
109	41,790	.....	41,790	26½
EMPIRE DISTRICT				
101	33,808	.....	33,808	27
211	.....	31,488	31,488	24½
216	.....	30,312	30,312	25
PEDRO MIGUEL				
231	.....	33,374	33,374	26

Best Records for One Day

Shovel	Location	Date	Character of material excavated	Cubic yards
232	Empire	Aug. 14	Rock	2,308
124	Empire	Aug. 30	Earth	2,223
210	Empire	Aug. 12	Rock	2,002
229	Culebra	Aug. 17	Rock	3,021
212	Culebra	Aug. 16	Rock	2,942
*256	Culebra	Aug. 30	Rock	2,649
207	Culebra	Aug. 21	Rock	2,622
231	Pedro Miguel	Aug. 20	Rock	2,337

*Marion Shovel.



Maps showing the Location of the Panama Canal. The Dotted Portion of the Profile shows the Excavation made by the French and the Solid Black the Portion to be Excavated by the United States Government.

Maintaining the Efficiency of Steam Shovels on the Panama Canal

*By Fitz J. Lewis

THE whole world has marvelled at the rapid strides made in the work of building the Panama Canal. When the work was undertaken by Uucle Sam it was pretty generally conceded that it would be finished. The question as to when it would be completed was quite another matter and, when our engineers stipulated that it would be ready for operation in 1915, much doubt existed.

However, the work is now rapidly nearing completion and we have pleasure in pointing out one of the many reasons why such rapid progress has been made.

The excavating machines used in the building of this greatest of all engineering works are of necessity of the same calibre—the greatest of all excavating machines. It is only necessary for one to watch the operations of these excavators, to realize the fact that they are subjected to stresses and strains most difficult to estimate.

While they are constructed of materials best suited to the work, and wrought according to designs of the most capable engineers, they, nevertheless, suffer from the ills of overwork and must be constantly doctored and repaired if their original high efficiency is to be maintained. Besides these natural and expected ills, due to routine work, it sometimes happens that the side of a rock hill falls upon a machine, or it is accidentally dumped into a ditch and in either case it is partially or wholly demolished.

An official order of Col. Goethals, the Engineer in charge reads, "Steam Shovels must be kept running during working hours".

To provide for these contingencies and enable the working force to comply with the order quoted, the Panama Canal Commission organized at the beginning of operations and has maintained at the highest possible efficiency since that time, a Repair Department which is the subject of this article.

The "Repair Department Shops" are located on the Panama Railroad at Empire, 12 miles north of Panama City. This location is practically at the centre of the famous "Culebra Cut", at which point sixty per cent. of the steam shovels engaged upon the Panama Canal are at work. They are unquestionably the largest shops in the world devoted to the repairing of steam shovels exclusively.

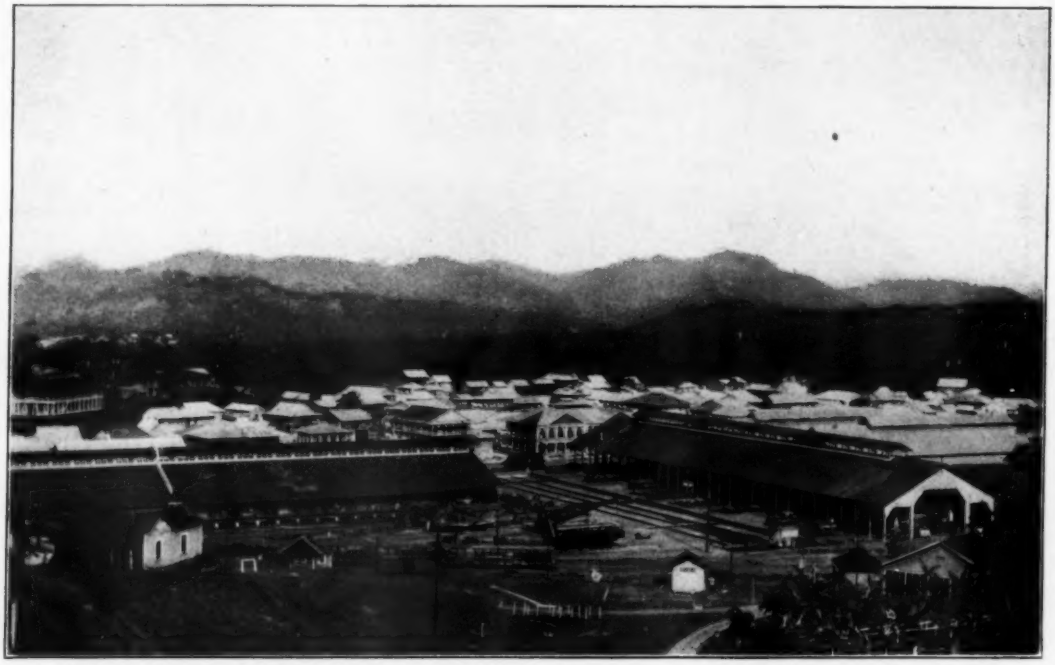
The erecting shop is 80 ft. wide by 375 ft. long, having fourteen pits of uniform size. These pits greatly facilitate the work which must be done underneath the car bodies or trucks. The work is served by a twenty ton Morgan Electric travelling crane running the entire length of the building.

West of the Erecting Shop is the Machine Shop also 80 ft. wide and 230 ft. long, equipped with the most modern machinery, of heavy pattern, for machining any part of the shovels, even the heaviest steel base plates and dipper backs. This shop is served by a ten ton Morgan Electric travelling crane which also runs the whole length of the building.

East of the Erecting Shop, and at right angles to it, is the Boiler Shop. This building is 100 ft. wide and 450 ft. long and equipped to handle all

95-ton Bucyrus Steam Shovel No. 218, totally wrecked by rock slide in Culebra Cut, June 5th, 1912. Note the size of the rock that fell on her from a 60 ft. bank.

*Superintendent of Empire Repair Shops.



View at Empire showing part of the Repair Shops of the Panama Canal Commission.

kinds of boiler work. Fuel oil furnaces are used for heating rivets which are headed up by pneumatically operated bull riveters. A twenty ton Morgan Electric travelling crane serves for the transfer of heavy work and five auxiliary air hoists, which travel on "I" beam runways, are used for the lighter parts.

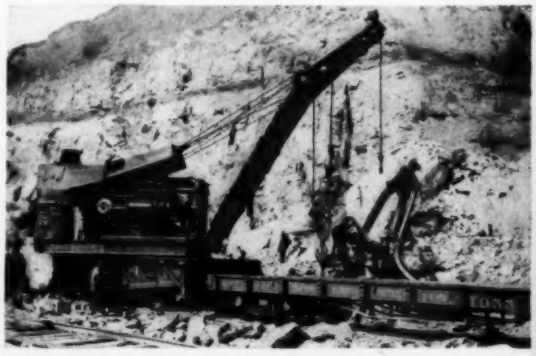
The Blacksmith Shop, a building 80 ft. wide and 230 ft. long, is located east of the Boiler Shop and adjacent to the east end of the Erecting Shop. It is equipped with 22 modern forges, twenty being fired by coal and two with oil. All of the latest blacksmith shop appliances, including two large steam hammers and two power cushion hammers have been installed and greatly facilitate the doing of any kind of work called for. Compressed and free air are furnished for blowing the forges, the free air being used when the power compressor is shut down for repairs.

North of the Blacksmith Shop is the Woodworking Department which supplies the necessary repair parts made of wood. These embrace booms, dipper handles, running boards, cupboards, tool boxes and many other lines of work.

Electric light and power is supplied throughout the plant as is also compressed air for the operation of pneumatic tools of the latest designs for all purposes.

Wherever shafting is used it is driven by electric motors and it has been the effort of those in charge to eliminate belts as much as possible because of the fact that they rapidly deteriorate owing to climatic conditions.

An oxy-acetylene welding and cutting outfit effects material savings in doing many repairs that require these operations.



Bucyrus 75-ton wrecking crane wrecking Steam Shovel No. 218 from under about 650 tons of rock, June 6, 1912, in Culebra Cut.

When the repairs upon a machine have been completed it is erected and thoroughly tested out under its own power before it is returned to its station. It is again dismantled and transported to the work where the night repair crew erect it and have it in commission by morning.

The equipment of the night repair crew embraces a 90 ton Locomotive Crane and 35 ton Wrecking Crane, two flat cars for heavy and bulky supplies, and two box cars. One of these box cars carries small supplies while the other is a portable machine shop, the equipment consisting of 14 inch engine lathe, shaper, drill press, emery wheel and compressed air engine for operating them. The air for this service is supplied by the locomotive.

The night repair gang leave at 5:30 each evening, except on Sundays and Holidays, the crew consisting of eight machinists and thirty helpers.

It is no uncommon thing for this crew to dismantle a shovel to the extent of removing boom, dipper and stick, base plate, swing circle, hoisting and swing drums, swing engine, intermediate and propelling shafts and front trucks and then replace them with a delay of but eight working hours.

This equipment is also used to go to breakdowns during the day time. In addition to it there are five hand car crews, each consisting of a boiler maker, machinist, and four or five helpers. These crews take care of all minor repairs and also leave the Repair Department Shops at 5:30 each evening.

A complete telephone system reaching to every part of the canal operations keeps the Superintendent of Repairs in close touch with the requirements and it is very seldom that a machine is delayed during working hours on account of repairs.

It is this efficient and extensive repair service that must be given due credit in making the "dirt fly" on this wonderful piece of engineering work. It well deserves much of the credit for the rapid work which has been done for without it days, weeks and months of delay would have been inevitable because of the many serious breakdowns and wrecks that have occurred.

95-ton Bucyrus Steam Shovel No. 218 as she appeared in the Empire Shop Yards after the wreck from rock slide in Culebra Cut, June 5th, 1912.

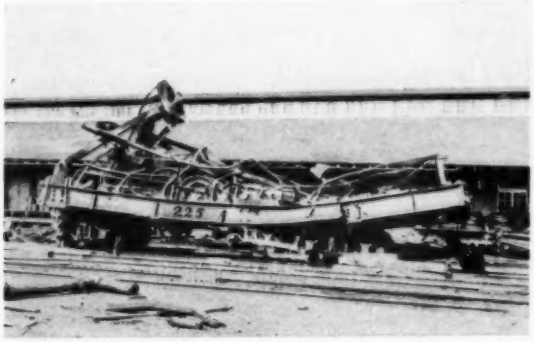
That the reader may have some idea of the magnitlde of the work thus far accomplished in this huge undertaking we quote in condensed form from The Engineering News of June 27, 1912 in

Wrecking a 95-ton Bucyrus Shovel No. 225 with one 100-ton and one 75-ton Bucyrus Cranes. This shovel was a total wreck but was rebuilt and put back in service.

which it gives "A Summary of Eight Years' Work on the Panama Canal". Eight years ago the United States assumed the undertaking of building this canal. This was 23 years after work had been inaugurated under De Lesseps, and after nearly $400,000,000 had been expended by the French companies. For their rights the United States paid $40,000,000. This amount paid for some 78,000,000 cu. yds. of excavation and a great variety of equipment, some of which has been in continuous use since, but far more has been sold as scrap metal. Of the 78,000,000 cu. yds. excavated, only 30,000,000 cu. yd. came within the canal prism as it has been constructed.

On May 1, 1912, 171,250,000 cu. yds. of material had been excavated and less tyan 24,250,000 cu. yds. remained to be removed, which is being done at the rate of 2,500,000 cu. yd. per month. Culebra cut is more than 90% completed. The steam-shovel cut is now less than 17 ft. above the bottom of the channel at Culebra, the summit of excavation. The greater part of what remains to be excavated lies between Empire and Gold Hill, a distance of about two miles. On May 1st the great concrete locks at Gatun and Pedro Miguel were almost ready except for the gates and the locks at Miraflores were more than 65% completed, with the work advancing at the rate of 20,000 cu. yds. of concrete per week. At Gatun, for the locks and dam, nearly 2,000,000 cu. yds. of concrete have been placed since the work was begun. At the Pedro

Miguel locks the total placed is about 840,000 cu. yds. and at Miraflores, nearly 900,000 cu. yds. This makes a grand total of about 3,700,000 cu. yds. The manufacture of the great steel gates was started in October, 1910, and their erection begun the following June. On March 31, 1912, the erection of 58,000 tons of structural steel into 46 pairs of lock gates was already one-quarter com-



Steam Shovel No. 225 as she appeared in the Empire Shop Yards after wrecked from rock slide July 3, 1911.

pleted, a task which entails the driving of 6,000,000 field rivets. The contract for machinery for operating the gates was let in June, 1911, and erection was begun in January, 1912; in May, one gate at Gatun had already been fully equipped and successfully operated. Of the valves which control the flow of water into the lock chambers, two had been put in place on March 31, 43 were ready for erection and the contract for the entire 134 had been let, a total of 1876 tons of metal. The installation of the 120 special cylindrical valves which control the flow of water from the center culverts into the lock chambers is practically completed except for a few in the Miraflores locks.

The erection of the first of the six great emergency steel dams which will guard the upper levels of the locks in case of accidents to the gates has been begun at Gatun and the fabrication of the other five is under way. Each is built essentially of a pair of cantilever trusses, 263 ft. long, so pivoted that their longest arm may be swung across the 110-ft. locks and the wicket girders which form the dam dropped into place. The total weight of the six dams is 12,000 tons. The fender chains for preventing unmanageable ships from colliding with the gates and hydraulic apparatus for operating them are in the process of manufacture at the Boston Navy Yard, and one of them has recently passed a successful test. The fenders for the approach walls will soon be ready to place in position. The electrical apparatus required to operate the locks includes 944 motors, all of 220-volt, 25-cycle, three-phase alternating-current type, and of these 803 have already been contracted for. The contract for the hydro-electric plant at Gatun, which will furnish most of the power for the operation of the locks, has been let and work on the station building will soon be started. The Gatun dam is rapidly nearing completion. The concrete spillway is so far completed as to make possible the closing of the sluice gates, and in the course of a few months Gatun Lake will be at an elevation of 50 ft. above sea level. The west dam at Miraflores has been practically completed. The east dam there is to be a concrete wing wall and has not yet been begun. The work on the west dam at Pedro Miguel is also practically completed. Work on the fortifications to guard the canal was begun during the present year. Besides all this work in constructing the canal proper, almost the entire line of the Panama R. R. has been relocated and the work of rebuilding on the new location is nearly completed. Thus at the end of eight years the end of the great undertaking, without failure in any detail, is actually in sight. Already laborers are being discharged and greatest pressure of work has passed. To accomplish this the United States had expended up to March 31, 1912, $252,000,000, including the payments to the French company and the Republic of Panama.

Storage Warehouse at Empire Shops.

Steam Shovel Work

By W. E. Bancroft

TO do work economically in the field, it is an axiom that the equipment must be proper in condition and suitable in design. It need not necessarily be of the very latest model, with all the new improvements, for it sometimes happens that the high cost of new equipment may render its purchase inexpedient. But, and this point must receive emphasis, the equipment must be of the right kind and in the right condition.

Sand is dug with a large dipper and a sand lip, and rock with a smaller dipper and the best teeth.

The writer had occasion to reorganize a job on which were working a Bucyrus shovel of a certain size and one of another make that weighed a good many tons more than the Bucyrus shovel did. The work was in rock, badly blasted, and taxed both shovels to the utmost. It happened that because of greater power in lifting and crowding motions the Bucyrus, which was by far the lighter shovel, was able to do more efficient work in the rock, while there was no appreciable difference in performance in clay and loam, for which materials the heavier shovel was amply strong. It was entirely capable of carrying a dipperful of rock to the car, but it often stopped when attempting to break rock with the teeth.

Experience with another shovel in narrow trenches, demonstrated that it was effecting no saving over hand labor. For digging cellars, or trenches of twice the width of those that it had to excavate, or for clay material free from boulders, it would have been highly economical.

For each piece of work there is economically one best type (not necessarily one best manufacturer) of equipment, and to handle the job cheaply it is necessary to have that type.

The quality and amount of the superintendence will greatly affect the unit costs on the work; and by superintendence we mean not only the man in charge, but his whole directing organization.

The work in the iron ore country is an example of what may be accomplished in the way of skilled organization. It is with increasing force coming to the attention of managers that superintendence is a many sided art, requiring study as well as experience, and trained helpers in addition to a timekeeper. Special appliances, such as stop-watch, record blanks and tally machines, are necessary for the best control over the daily conditions. Cost keeping on the job must be applied immediately after performance, or else it is too late to take advantage of the lessons of cost and to economize the work.

Pure observation alone without actual timing, will not show a superintendent whether it is more economical for him to use nine-car or ten-car trains to haul material away from his shovel. Logic alone will tell him whether the shorter or the longer train is the better to use. He will generally favor the use of long ones if his engines will haul them. Yet money has been saved by shortening trains even when the engines could easily haul the longer ones. In this case the key to the situation was the time required to dump and transport.

So many conditions of management enter into efficient steam shovel work, that it is most sensitive to variations in the superintending organization.

General arrangement always receives great attention from skillful managers. The "old line" contractor comes upon the job and looks it over from the seat of his buggy, deciding on the ground where he will begin operations and how he will remove the material from the shovels. The modern manager undertakes it much in the manner of a German professor attacking a mathematical proposition. Sometimes there is only one place to cut in and only one way to handle the earth or rock; but generally there are several places to cut in and many, many ways available for handling the material. If there were only three ways, and there are seldom less than twenty-three, he is bold man who would decide off hand which is unquestionably the best of the three, until an economic study has conclusively established the facts. To do this it is necessary to consider methods in use in other places and often in other lines of work. It happened that the subaqueous drill operators developed the fact that pumping a jet of water under high pressure into a drill hole would greatly decrease the cost of drilling rock; and they were led to try the plan because water was just over the side and good force pumps were on board the drill boats. This device in the subaqueous field has saved large amounts of money when applied to drilling on land.

(To be continued)

65 Ton Bycyrus Steam Shovel Loading Gravel.

Right and Wrong Way in Washing Gravel

PERHAPS nowhere could there be found a better example of the importance of careful attention to the conditions to be met in even the seemingly simplest of work, than at the plant of Galagher Bros. Sand & Gravel Co., Port Washington, Long Island, N. Y. A gravel washing equipment installed here a year ago fell so far short of satisfactory performance as to cause its abandonment in favor of a new and totally different outfit.

Looking Down on the New Washery from the Old One.

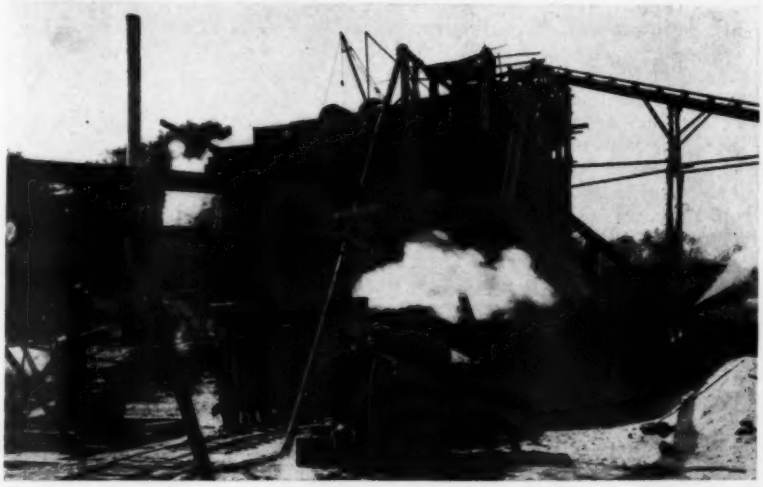
The Gallagher brothers—John J., Peter C. and Frank F.—handle the three very necessary corners of a big business in supplying sand and gravel to contractors and constructors in New York City and vicinity. John operates the plant, Frank runs the home office, and Peter attends to the sales work in the big city.

In 1909, when former banks at Manhasset became exhausted, the present property of nearly 300 acres in sand and gravel land was acquired, on Hempstead Harbor inlet, 5 miles from Long Island Sound. Here there is about 9 ft. of water at high tide; at low tide the boats at the shipping dock, settle in the mud to await the return of the waters.

The plant installed was designed for a capacity of 3,000 cubic yards per day of ten hours, but the gravel washing portion was so unsatisfactory that it not only failed to attain this capacity, but would not do its work well at all, even at a much lower rate of operation. The screens were not adapted to the nature of the materials to be handled here and were of entirely too small capacity.

The Webster Mfg. Company was then called upon to investigate the situation and recommend the proper remedy. The results of this action are now embodied in a new and perfectly adapted gravel washery, built adjacent to the unsatisfactory and now abandoned original.

The working equipment now consists, therefore, of the sand plant, and the gravel washery. Between these two is the abandoned gravel plant.



Hauling Washed Gravel to the Loading Dock.

View of Plant from the Gravel Bank.

The material is brought from the rear of the plant, where it is loaded into cars by steam shovels, in two pits, which gradually will work together into one. Steam locomotives haul the cars to a track hopper, where their loads are delivered to the sand house.

Separation is made into four grades—dry-screened sand, washed sand, torpedo sand, and gravel.

Material carried to the top of the sand house is passed dry over 3-16 in. gravity screens, the fine material dropping into pockets beneath. The coarser parts, gravel and boulders, are chuted to a hopper feeding a 24-in. Webster belt conveyor leading upward to the top of the washing plant, where delivery is made into a receiving hopper. Water from a large duck-bill nozzle flushes the material into and through the screens.

The screens are of the Webster cylindrical type, 48 in. by 16 ft. in size and twelve in number, arranged in four sections of three each. Only two sections having at this time been placed. The other pair will be erected later, together with a 24-in. Webster belt conveyor to bring material direct from the bank. Then the washery can be fed from the sand house or from the bank, or both, giving any desired proportions of dry and washed sand.

The material passing through the first screens, with their ¾-in. perforations, is flushed into the second or ¼-in. screens, the rejections from which are spouted to the gravel pockets. Similarly, the third screens, ⅛-in., take out the torpedo sand and pass the fine sand and water on to settling tanks, whence the water is drained away to waste.

Boulders tailing from the ¾-in. screens are chuted to a crusher, where they are broken and dropped into a hopper which feeds a belt conveyor leading back to the top of the sand house, whence the material goes again to the screens.

At lower ends of second and third screens are back-jets of water which are very effective in cleaning and brightening the gravel and torpedo sand as they tail out. In the chutes to the pockets are placed perforated metal screens on which the material is retarded to drain away the water.

Power for the gravel washing is supplied by a Webster Method rope drive from a 110 H. P. steam engine. The ropes are guided over idlers for fair lead to the driven sheave on a jack line, from which distribution is made to conveyors, screens, crusher, etc.

Water for the washery is delivered by a triplex pump, with steam engine and boiler, in a pump house at the creek passing the plant.

By side bin gates at the sand house, and double undercut gates beneath the washery, the materials are dropped into dump cars for hauling by steam locomotives, to the shipping dock, loaded on scows and towed to contractors or dealers in New York.

Aside from the stationary plant, the company's equipment includes four 12-ton steam locomotives two Bucyrus steam shovels, 25 dump cars, 18 scows and a towing tug.

The Webster installation proved to be admirably adapted to the work and its daily capacity exceeded all expectations.

The separations made by this plant were so sharp and the sand and gravel so thoroughly cleaned, that the material was notably superior so that the showing made by the plant in the first few weeks of its operation was the means of securing a large contract for work on the high-pressure tube of the new Hudson River Aqueduct.

Loading Dock, Hempstead Harbor.

Stripping Asphalt Rock

WE are indebted to Mr. George M. Brown, Steam Shovel Engineer for the Wadsworth Stone and Paving Co., of Pittsburg, Pa.. for the three views shown herewith.

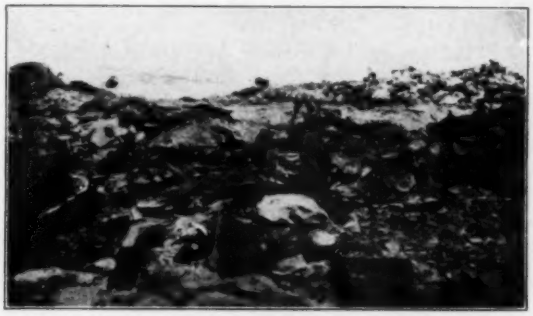
Little Giant Vulcan Steam Shovel Removing Overburden from Rock Asphalt Quarry, Asphalt, Ky.

The work involved is the stripping of the rock and clay overburden at the asphalt rock quarries owned by the Wadsworth Company and located at Asphalt, Edmonson County, Kentucky. The overburden consists of eight feet of clay and four feet of sandstone which it is necessary to blast before loading.

Mr. Brown states that the work is being done with a Vulcan Little Giant special 32 ton shovel and that it was used on this work continuously for four months without any expense for repairs. More than 80,000 cubic yards of rock and clay were handled in this period averaging approxiamtely 800 cubic yards per day of 10 hours.

Rock Asphalt Quarry, Asphalt, Ky., showing Asphalt in Foreground after Blasting.

After the overburden is removed the asphalt rock is blasted and broken by hand after which it is shipped to the company's reducing and mixing plant. Here it is crushed, subjected to heat, mixed with other materials and molded into suitable blocks for pavement. In this form it is more readily handled then in the plastic state and, it is claimed, makes a most durable paving material.



Blasted Rock Asphalt Ready for Loading.

This is Encouraging

The first steamship for fifty-two years to leave Philadelphia for a Brazilian port, says the Philadelphia Press, sailed for Rio de Janeiro on July 27. It was the steamship *Corozal*, under Captain Mundy. She carried a cargo of railway construction material, locomotives and cars. It consists of 23 complete locomotives built by the Baldwin Works; 36 steel railway cars, made by the American Car and Foundry Company; $28,952.56 worth of steel rails, splice bars, spikes, and bolts, and three boxes of locomotive machinery. The value of the entire cargo is $395,262.56. The last vessel to sail to a Brazilian port was the *Metropolis*, which left Philadelphia fifty-two years ago under Captain Dickman. Unfortunately this vessel never reached southern waters, but went ashore off Cape Hatteras and was lost. The captain and four or five men of his crew were rescued.

It is encouraging to know that even one ship has sailed from Philadelphia direct to South America. Let us hope that we shall soon have a monthly or bi-monthly service.

Often Happens So

Mr. Newlywed—But, I thought, dearest, we had planed to go to the theatre this evening?

Mrs. Newlywed—Yes, love, but I have changed *our* mind.

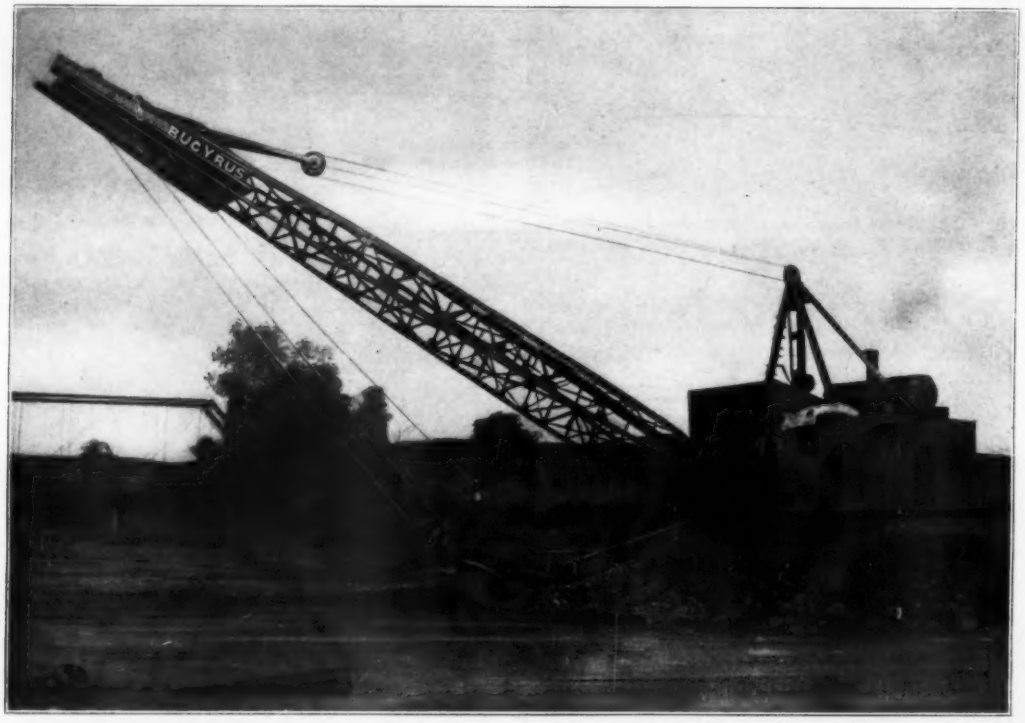
The meanest story comes from Chicago. It is about a lithographer who eloped and got married in New York and instead of getting a marriage license got a dog license—and led a dog's life ever after.

Handling Solid Cobble Stone Formation With a Drag Line Excavator

FOR some years the town of Herkimer, N. Y. has been suffering severely from property loss and incidental damage due to inundations from the heavy Spring floods caused by the West Canada Creek, which flows through the town, emptying into the Mohawk River a short distance below.

This yearly inundation has resulted from an ice jam which forms above the trolley bridge north of Herkimer. This not only endangers property in the town proper but renders practically valueless broad stretches of land lying between the curves of the creek. The natural flow of the creek, which ordinarily would have a tendency to prevent the jam has been greatly reduced by the construction a few years ago, of a 20 ft. canal leading to several knitting and pulp mills about three miles north of Herkimer.

To improve these conditions the town has decided to deepen and widen the creek and to straighten its channel thus giving it a more direct flow, and hence more power to carry off the ice in the Spring. Lathrop, Shea & Henwood have the contract. This consists of widening the creek to a width of 100 ft. and deepening it to an average depth of six ft. At present this is being done in three sections—the first in the town of Herkimer immediately above the bridge, the second just below Herkimer, and the third in the Mohawk River just below the mouth of the creek.



Bucyrus Class 14 Drag Line Excavator at work on the West Canada Creek improvement near Herkimer, N. Y.

As stated above the first two contracts are for widening, deepening and straightening the creek. On the second section, the one immediately below Herkimer, the contractors have been using a Tower excavator, a 70-C Bucyrus shovel and teams and scrapers for making the slope and trimming up.

The third section, the Mohawk River, which includes the deepening of this river, is being handled by a hydraulic dredge.

The first section, that immediately above the bridge, is being excavated by a Class-14 Bucyrus drag line excavator. This section is about a quarter of a mile in length. The machine travels down the

Bucyrus Class 14 Drag Line Excavator digging cobble stone formation near Herkimer, N. Y.

west bank digging the creek to a width of about 70 ft. and depositing the material to one side. The digging is extremely hard, it being a solid boulder bottom. The Bucyrus bucket has proved itself eminently adapted to this class of work and is giving excellent satisfaction. In fact, in the first 15 days that this machine was in operation, it is said to have handled more material than the Tower scraper and teams did in four months. As the machine moves down the bank it builds its own runway, which is very easily done, the cobble stones and boulders making an exceedingly solid foundation for it to travel on.

After the machine has finished this stretch it will be moved back of the spoil pile which it has just made and will travel up the section again widening the channel to its requisite width, i.e., 100 ft. and rehandling the spoil pile.

The excavated material will form a levee which is intended to protect the town from inundation. It will have a crown of from 15 to 16 ft. on which a state road will be constructed.

The drag line works two 8-hour shifts and burns a little less than 1½ tons of coal per shift, which includes the coal used for banking the fires at night.

Besides the engineer and the fireman there are two pitmen who do odd jobs around the machine, tend to the rollers, etc., and one coal man who carries the coal from the supply pile in a sack. This is necessary inasmuch as it is impossible to get near the machine with a wagon.

The excavator carries a 1½ yard blcket and a 60 ft. boom. With a skillful operator it has no difficulty in depositing the excavated material for 130 to 145 ft. from the point where it is excavated. It digs 60 ft. from its own center.

Pat Candy is Superintendent and Wm. G. New erected and ran the machine for a period of ten days.

Lathrop, Shea & Henwood Co., were the contractors.

Class 14 Bucyrus Drag Line Excavator used as a crane while laying pipe on Los Angeles Aqueduct.

A Drag Line Excavator Used as a Crane

The construction of the Los Angeles Aqueduct has given rise to the use of a great many different types of excavators.

In the illustration herewith we show an interesting adaptation of a drag line excavator. This machine, a Class-14 Bucyrus equipped with a 60 ft. boom and a 1½ yard bucket, is here used for digging a 3,000 ft. trench for a 10 ft. steel pipe. After a section of the ditch had been excavated to the required depth and width the bucket was dropped and the machine used as a crane tolift the sections of pipe into place.

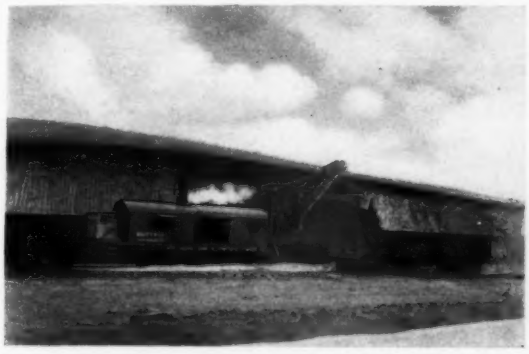
The drag line excavator has given excellent satisfaction for this purpose. The economy resulting from the saving in extra equipment is very obvious.

70-C Bucyrus Steam Shovel built for the Copeland-Inglis-Shale Brick Co.

The Chicago Brick Industry

By J. W. Bright

A fact that many do not stop to consider is that Chicago, true to her emblematic determination, "I will", has risen and continues to rise, phoenix-like, from her ashes. In other words, that she is being builded from her own soil and that annually there is excavated from mother earth in and about her limits approximately 2,750,000 tons of clay for the manufacture of building brick. Practically all these brick are used in building Chicago structures, for there is only a small percentage of the billion and a half brick manufactured in Chicago each year that are shipped more than a few miles beyond her limits. These are stupendous figures and such as make Chicago stand in a class by herself.



Monster Shovel at Work in Carey Yard, Chicago.

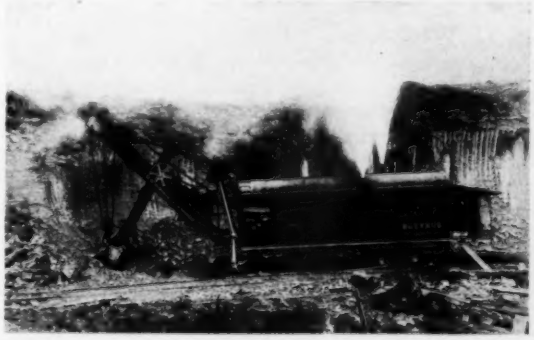
The average number of tons of clay required for the manufacture of each million of brick is 2,750 tons. For the digging of this clay a number of monster steam shovels of Bucyrus, Vulcan, Atlantic and other makes are employed, to say nothing of the many smaller yards that do not posses such equipment. Most of the yards, however, are operated by the most modern methods and in order to reduce costs to the minimum they must be equipped with labor-saving machinery. The equipment of the Chicago clay pits represents an investment of half a million dollars.

The work of these monster steam shovels is in some respects marvelous. Like huge iron and steel tigers devouring their victims, they take mouthful after mouthful of the clay with insatiable appetite. The operation is one that has a fascination about it, and holds the interest of the spectator with rapt attention. By such operations only is it possible to keep pace with the increasing demands that are today made upon the brick operators.

One of the difficulties that every operator has to contend with is that of flooding of the clay pit. Extent of water trouble varies but no brick manufacturer can entirely escape this handicap. In order to drain the pit, many use pumps, as offering the quickest and most satisfactory means of removing the water. This is carried away by pipes far enough distant to not again become a source of annoyance. Sometimes clay digging is suspended while the water is being pumped out, and often the clay is too wet to be removed for some time after the water has been pumped out.

The mining and handling of clay for the manufacture of brick is one of the most important operations of the clayworking industry. In some sections it is necessary to dig shafts and mine the clay or shale as the mining of coal is done. In most localities it is necessary to strip the surface of the clay bed for some few feet, in order that the available clay or shale may be reached. There are different methods for doing this, sometimes it is accomplished by manual labor or by scrapers and sometimes by steam shovel, which is the most approved method, as it not only saves time and labor but is far more satisfactory in results.

In the vicinity of Chicago, however, conditions are very favorable for such operations, and the soil does not require any stripping, with the exception in some instances of the removal of top soil with scrapers, although as a general rule no stripping is required. The nature of the soil is such that it can be utilized from the top to considerable depths, depending upon the location. The clay deposits, which are sedimentary until a point as far north as Heron Park, Wis., is reached, vary from 50 to 125 ft. in depth. The latter is rare, the average depth



The Steam Shovel Excavating Brick Clay.

being not above 90 ft. Ocassionally sand pockets are encountered, but these are not frequent, and the clay as a rule is good, and makes a satisfactory building brick.

With few exceptions the soil is a blue plastic clay, though there is some yellow intermingled. Recently there has been found a layer of soft shale of about 10 ft. in depth, which can possibly be utilized in the manufacture of pressed brick. The clay in and about Chicago has been thus far, however, unsuited for other than common building brick. With the enromous increase in the demand for this brick each year there is no cause for anxiety as to the future and the manufacturers have all that they can do to supply the trade.

The largest clay pit in the vicinity of Chicago, covering about 125 acres, is that of the Carey Brick Co., located near Dunning; however, one nearly as large and one that has been worked to a considerable extent is that owned by the Illinois Brick Co., near Blue Island, containing about 100 acres of land.

There are employed in the building brick industry in and about Chicago in the neighborhood of 2,500 men. This number is necessary as a compliment to the steam shovels that have taken the place of hundreds of men in the single operation of excavating the clay. These men are necessary for the operations requiring human hands. The buckets on the shovels will average two and one-half yards, so that it can be seen how much more can be accomplished today than in the days when it was necessary to dig the raw material out by hand. From the shovels the clay is dumped into dinky cars and hauled up inclines to the brick plants. The clay is never placed in sheds to be weathered, but is used as it comes from the pit.

Reaching the plant it is dumped into the granulator where it is crushed between two iron rolls from which it drops into the pugmill. Sometimes the clay is too wet, and the brick dust, made from crushed brick bats, is then added to the mixture. If the clay is too dry, water is added while the clay is in the granulated state, and also in the pugmill, so that the clay, when it enters the brick machine, is stiff. The latest equipment is employed in the plants and the bricks are dried out in 24 hours and burned with oil fuel in from three to four days.

In Chicago everything is brick. She revels in her mud, as it were, and builds her homes and business blocks and factories with the soil that has been placed at her doors. Brick are the most popular form of structural material in this locality, and there is certain to be no lessening in the demand for the same in the future.

In the matter of clay excavating Chicago is peculiarly blessed, and with her large equipment and large plants and exceedingly large output and demand she has much to feel thankful for. Her citizens are loyal to the important home industry that she possesses, and have so shown in their consumption of this commodity. The manufacture of brick has become one of the largest industries in the "Windy City". Chicago is ever an enthusiastic "booster" of her own products and believes in using what she has at hand ready for use. Brick have always been her favorite and they will continue to be in the days when other materials are less thought of than they are now.

The Excavating Engineer

[FORMERLY THE STEAM SHOVEL NEWS]

A Monthly Publication Devoted to Excavating *and* Allied Subjects

Contributions bearing upon the practical aspects of the above work are solicited, and if accepted will be paid for at the usual rates.

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To Our Readers

We would greatly appreciate a few words from our readers expressing their views regarding the changes inaugurated with this issue of the paper. If you like it, say so. If you don't, tell us why you don't. We want your co-operation to make it the best in the field.

For your convenience we insert an addressed post card.

Our Improvements

The readers of the Steam Shovel News have shown such interest in the publication that we have decided to enlarge its scope by giving it an entirely new and improved form and by changing its name.

It will be our constant aim to publish articles of current interest and value to our friends in this rapidly broadening field and to that end we solicit information and photographs relating to work in hand. These contributions should be as complete as possible, from the contractor's viewpoint, and the more profusely illustrated the better.

Under the caption "Shots from the Firing Line" we shall be pleased to print short notices telling where the contractors and their men are at work. We feel that this is a valuable adjunct to the paper as, in the past, it has in some cases been the only means of locating men and concerns with whom communication was sought. As a further aid to our friends in the field we have decided to add the "Mail Forwarding Department" which, as its name implies, will be devoted to receiving and forwarding of mail to men or concerns engaged upon construction work. Those who desire may have their letters or telegrams addressed in our care, 267 National Ave., Milwaukee, Wis., U. S. A., and we will promptly forward them if they will keep us posted on their location. Where no forwarding address has been given us we shall, publish the names of those for whom we have messages in the next issue of the paper following the receipt of same.

We urge our friends to take advantage of this department of the publication. For this service we make no charge whatever.

We ask our readers to scan carefully the advertising pages from month to month and when asking for prices or catalogues to mention the fact to advertisers that THE EXCAVATING ENGINEER has been the medium that called attention to the goods sought. This is a courtesy much appreciated both by the advertiser and the publisher and its value is reflected in increasing patronage by the manufacturer and constant improvement in the paper made possible by this support.

When material or machinery not advertised in our pages is required, we shall be glad to assist in locating the manufacturers for our readers if they will only make known their requirements. In fact, when you are in need of information of any kind, write us.

We shall also be pleased to have information regarding any new projects that our readers may learn about.

Panama Canal Record

The estimates of excavation remaining to be done after July 1, 1912, in order to complete the Canal, show an increase of 16,903,000 cubic yards over the estimate of July 1, 1911.

In the Atlantic Division, the increase is 295,000 cubic yards, chiefly to provide for silting in the finished channel not covered by the estimate of July 1, 1911.

In the Central Division, an increase of 4,615,000 cubic yards is made to provide for an extension of slides, and changes in the Obispo Diversion.

The Pacific Division has an increase of 11,993,000 cubic yards, of which 3,199,000 cubic yards are to cover excavation in the Canal prism, in the locks and dams, and silting in the finished channel, which has become necessary since the estimate of July 1, 1911. The remainder—8,794,000 cubic yards—is for the newly begun excavation for the dry-dock, coaling station, and terminal at Balboa.

UMI

Business Forecast

Being well into the latter half of the year 1912, we are more and more impressed with the wonderful progress business has made since the first of the year. It was to be expected that the Presidential campaign would retard business progress, but the multiplication of candidates, parties and issues has brought about a polictical condition which is really helping the business situation. A clearly defined contest between two candidates or two parties on one or two issues of vital importance might have seriously hampered business activity. While some business may be more or less affected by the political situation until November first, even politics cannot prevent the gradual but persistent expansion in most lines which is now taking place, and which bids fair to continue through the year.

Aside from the labor situation, the largest cloud in an otherwise clear business sky, has been the number and size of Business Failures. Failures for July were 1153 against 1013 for the previous month, and 1027 for the corresponding month of last year. The total liabilities were one-half million dollars more than in June, and nearly 6 million dollars more than in July, 1911. This was the largest number of failures ever reported for July and the largest total liabilities for that month, with the exception of July, 1908. It is believed that these figures indicate a cleaning-up and a wiping out of weak concerns. The next two or three months will show whether or not this is the case.

The activity in the BUILDING line continued through July, a total of 89 million dollars worth of buildings being under construction in 125 cities reported as against 83 million dollars for the same month last year. The gain over 1910 was more than 30%. Twenty leading cities, including New York, show a decrease of nearly two million when compared with July of last year, which was largely accounted for by the fact that Manhattan showed a decrease. Three-fifths of the cities reporting showed an increase over last year, which is gratifying.

For the month of June, 410 railroads operating nearly 200 thousand miles, showed Gross Earnings of 203 million dollars, an increase of 14 million dollars or 7½% over the previous July. The same roads reported net earnings of more than 65 million dollars, a gain of three million dollars, or more than 6% over July of the previous year. The gains shown are good indications, but in considering them we must remember that earnings last year were unsatisfactory and a considerable gain was necessary to the successful conduct of the leading roads.

Gross earnings for the first six months of 1912 are reported at 1329 million dollars against 1278 million dollars for the corresponding period of 1911, making a gain of 51 million dollars, or 4%. This offsets the 26 million dollar descrease shown for the first six months of 1911, as compared with the previous year, and when compared with the situation for the past ten years, is a fairly satisfactory showing in gross. For the month of July roads reporting operations on 90 thousand miles show a gain of 9% over last year, or nearly six million dollars.

The STEEL and IRON business is still the vital and uplifting factor in the business world. This activity is making business for everyone. The big iron production for the first half of 1912, which is reported at 14 million tons, was never equaled in the first half of any year except 1910, when it was nearly one million tons larger. The production for the first half of 1911 was less than 12 million tons. Should the present rate of production continue, a new record will be set for the output of a calendar year. Nearly all branches of the steel business show a healthy condition and an output far above average and almost up to capacity. The best feature is that better prices prevail.

Shipments of ANTHRACITE COAL for the first six months of this year were only 26 million tons against 35 million tons for the same period last year. July shipments added 6285 thousand tons to these figures, an increase of 1481 thousand tons compared with last July. Anthracite prices are higher and prepared sizes are scarcer, bit no real famine is expected.

The only thing which will assist materially in bringing about lower prices for FOODSTUFFS within the next few months is the promised tremendous farm output. An average of several hundred reports made by the best crop authorities indicates a crop of 3050 million bushels of corn, including silage; 1200 million bushels of oats; 35 million bushels of rye; 200 million bushels of barley; 990 million pounds of tobacco; 70 million tons of hay; 12 to 13 million bales of cotton, including linters; 24 million bushels of rice; 370 million bushels of potatoes. These crops, if they are successfully harvested and housed, coupled with the unusually good fruit and vegetable crops, will set a new figure for one year's farm production for this country. The crops of sugar beets, onions, tomatoes, cabbages and lima beans will be above the average, which is also true of apples, pears, peaches, grapes, cantaloupes and watermelons. The few fruit and vegetable crops which are below average are only slightly below, and good crops in general are practically assured.

The new spirit of "live and let live" between employer and employe has gained considerable headway during the past few weeks. Difficulties which might have resulted in serious strikes have been settled in numerous instances, while several important difficulties are now being arbitrated. Conditions are such that a year or two without serious labor disturbances would mean a great deal ultimately to the people of this country. It is to be hoped that present methods of settling difficulties will grow in favor.

South American Trade

We of us who have never had the opportunity of investigating the vast fields which lay to the south have little or no conception of the trade possibilities. It is a field of wonderful opportunities for American products and, with the opening of the Panama Canal, the United States of North America should become the logical market from which a large percentage of its requirements should be filled.

About a year ago the writer had an opportunity of visiting with an Engineer Salesman who had just returned from an extended tour of investigation covering the west coast of South America in behalf of one of our leading manufacturers. He was so enthusiastic over this field that he immediately resigned for the purpose of returning there as an independent representative of American made machinery. The glowing accounts he gave of the tremednous developments taking place there and the demand for machinery in which we excel were difficult to believe. The proof of his statements, however, lies in the fact that he has returned there as the direct representative of goods that are manufactured here. And this was done, not upon a salary basis nor through any guarantee of the heavy expenses which must be borne in the exploitation of these goods, but on an absolutely independent basis. This salesman could see the large profits which were possible and he was shrewed enough to do that which would save them for himself.

When manufacturers realize that, in these far off lands, there are opportunities for business at large profits and that are uninfluenced by the factors in the United States which cause the fluctuations so difficult to deal with, they will combine with their friends in Export Associations or go singly after these orders that will nullify the slumps in business conditions at home, and enable them to maintain their output at 100% at all times.

To be sure there are a few of our larger manufactuers who are now enjoying the profits from this very lucrative field. But there is no good reason why our exports cannot be increased many times over current figures if intelligent effort is put forth.

REVIEW OF BOOKS and CATALOGS

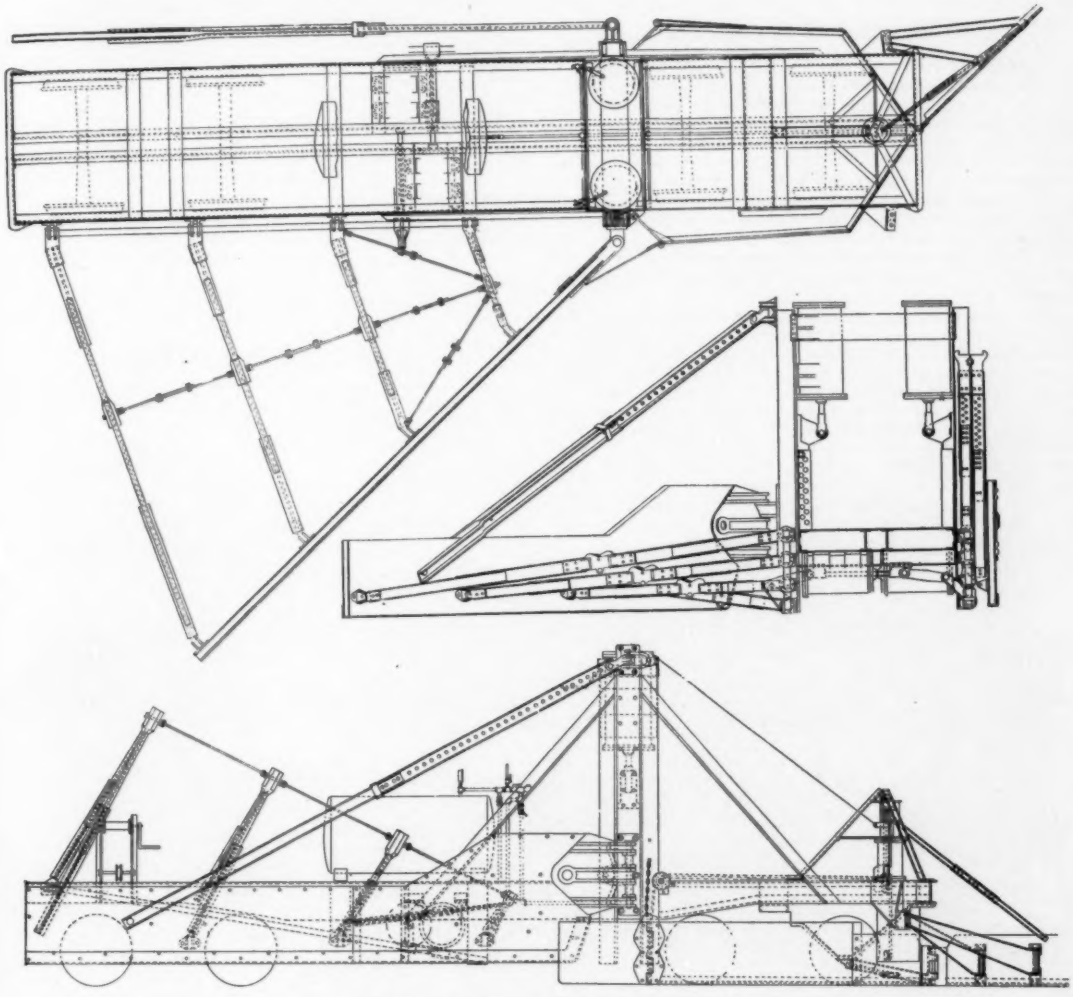
We shall be glad to review in this column such books and catalogues as are sent to us.

BUCYRUS CO., South Milwaukee, Wis.—General Catalogue, 6"x 9", 32 pages, profusely illustrated, showing the various lines of machinery manufactured.

The Improved Jordan Spreader

THE grader or spreader car originally designed and constructed by Mr. O. G. Jordan, then roadmaster on the Michigan Central R. R., has been so familiar a tool to railway engineers for upwards of a quarter of a century that its purpose and performance need no explanation. There have been many changes in the construction of the original Jordan Spreader, however, and the latest improved, all-steel, pneumatically controlled machine is in comparison almost a new and different device. As now constructed the Jordan Spreader is shown in all its essential details by the accompanying drawings. With wings folded and plow raised for transportation this improved machine is 35 ft. long, 10 ft. wide and 13 ft. high.

As illustrated, the main working parts of the spreader are the plow, which forms the front end embracing the forward truck, and the spreading wings. Between the plow and the spreading wings on each side are two small wings which close the intervening openings so that snow or earth cannot enter. Also to the nose of the plow is attached a scraper which, can be reversed, and which enables material to be shifted to right or left across the track. Both the spreading wings and the plow with its attached small wings and scraper can be raised and lowered.



Details of the Improved Jordan Spreader.

All raising and lowering of plow and wings, folding of wings, etc., are performed by pneumatic cylinders, 40 lbs. air pressure being ample for all operations.

The operation of the spreader is simple,. The plow and wings scrape down and spread level the materials as the car is driven ahead. The elevation of the cut and the width to which the material is spread is regulated by the position in elevation of plow and wings and by the spread of the wings. For cutting shoulders and ditches special attachments are employed. One man directs all the operations of the spreader.

In a subsequant issue we shall make further reference to this machine and give some interesting data concerning its operation and actual cost of handling material.

The Jordan Spreader is built by the O. F. Jordan Co. of Chicago, Illinois.

Western Hand Dumped Cars

The bed of the car is pivoted longitudinally in the center over the draft beams and will dump on either side; when dumping, the hinges, bolted to the center cleat under the bed, rock on the pedestal castings which are bolted to the draft beams. The connection consists of a flat bar resting loosely in the socket of the pedestal, the upper end of the bar being held between the lugs of the bed hinge by a pin.

The arms operating the doors act automatically. When the bed of the car is tipped the toggle strikes a plate fastened to the car frame and holds the door from dropping with the bed. Either side opens as the car is dumped and closes as the bed is returned to an upright position both automatically and instantly.

The door arms are pivoted, both where attached to the door and to the bed, in such a manner that as the bed is tilted the doors are thrust outward and upward from the load so that no part of the load as it moves is thrown against the door, removing the tendency to derail the car by the impact to which the cars of common construction are subjected. The device permits the load to be discharged immediately. The opening is wide, allowing the free passage of large boulders or masses of other material, the side doors being brought to a nearly parallel position with the bottom of the bed when the car is dumped.

The angle at which the bed dumps affords free discharge to any class of material. With the Western cars, no chaining is required to hold the car to the rails.

The bed is loosely attached to the truck. The weight of the car does not rest upon the horizontal pin which passes through the hinge so that there is no liability of bending the pin, thus avoiding the difficulty in dumping of the bed by the bending of the pin with such construction.

The beds are held in position by chains on each side, connecting with the truck and provided with spike and ring fastening, which can be released by the hand or foot while the car is in motion. The arms and the toggle-jointed levers which operate the side doors, are all connected to the bed, not being attached to the truck, so that when the side chains are unlatched the bed and truck are separable and in the event of derailment and rolling down an embankment, the bed and truck automatically separate, causing less damage to the car and making much easier its replacement on the track.

The bearing on which the bed turns in dumping is of such construction and perfect adjustment as to make the dumping and bringing back of the bed to position an easy matter.

Western cars are exceptionally low in height and the dumping angle of cars up to three yard size is 47 degrees, while the dumping angle for larger sizes is 45 degrees as measured on the track, though when dumping loads, the compression of the springs brings the actual angle to 47 degrees.

The standard gauge for the 1¼ and 1½ yard sizes is 24 inch; 2-yard, 30 inch; 3 and 4-yard and the double-truck 8-yard, 36 inch; 6-yard and larger (except 8-yard) 4 feet 8½ inches.

While these dimensions are the standard, cars will be made on any practicable gauge.

The best chilled wheels are used in all cars and are made strictly under Master Car Builders' specifications.

Improved double-acting spring drawbars are supplied on all side dump cars, so attached as to make it impossible for them to be pulled out. Where conditions require, the standard height of drawbar can be varied within a range of several inches.

Western Air Dumped Cars

The Western Air Dump Car is the logical upgrowth of the narrow gauge hand dump cars. The demand for a larger and still larger double side dump car has been insistent.

The first Western Air Dump Car was made about six years ago, and it has been perfected and standardized so as to conform with Master Car Builders' requirements, adapting it for use by railroad companies using standard gauge track.

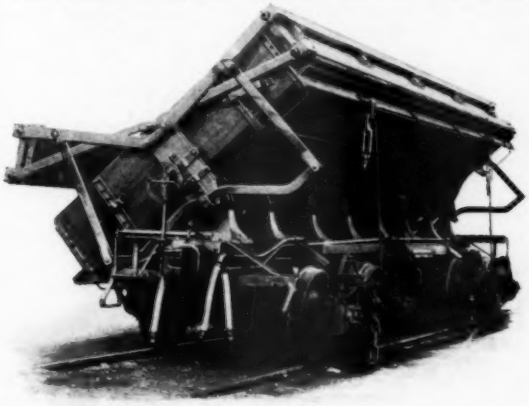
The car dumps its load clear, so that the train can be pulled out immediately without any shoveling by hand. It is especially

16 Yard Weatern Air Dumped Car in Upright Position.

adapted for trestle filling, raising grades and for widening road beds preparatory to double-tracking them and for ballasting.

With this car practically all the cost of unloading the ordinary railroad cars, particularly when done by hand shovelers, is saved.

In track elevation work in cities, they are of unusual value, as the trackage is often limited and the importance of the saving of time is doubly emphasized, in order to prevent delays of trains in entering and leaving terminals. As the operation of dumping and righting the bed of the car is practically instantaneous, the advantages in using this car on main line, where traffic is heavy and where blocking the regular train service would by expensive, are very apparent.



16 Yard Western Air Dumped Car in Dumping Position.

One of the prominent railroad companies states, that its records show that the cost of handling material by flat cars and unloading plows was double, and by old style "A" frame side dump cars, 25 per cent. greater than, with the Western Air Dump Cars.

Many of these cars have been used under shovels with 5-yard dippers, and have stood the strain of the work without breakage. This will serve to illustrate their strength of construction.

During the past two years the practicability and efficiency of the Western 20-yard Air Dump Car has been fully demonstrated on heavy railroad work. The great loads that they carry, the speed at which they may be run, and the fact that they are dumped almost instantaneously, makes the economy of their use self-evident.

This type of car is built to hold up to 30 cubic yards with 100,000 pounds capacity trucks. The standard sizes are for 12, 16, 20 and 30 cubic yards.

The cars are generally loaded to carry from twenty-five to thirty per cent. more earth than above mentioned, the material being heaped above upper edge of the beds and they have sufficient strength to carry such loads.

The Western car is manufactured under United States patents, owned by The Western Wheeled Scraper Co., Aurora, Illinois.

Class 80, Atlantic-Type Steam Shovel, Stripping Iron Ore for the Oliver Iron Mining Co., Hibbing, Minn.

Field Notes

A Reliable "Dead-Man"

When it becomes necessary to take a shovel up or down a steep grade the question of a reliable "dead-man" becomes very important. A device has been suggested which will hold firmly when stakes and stumps of trees will be pulled up with ease.

First dig a hole approximately 12′ x 12′ x 10′ where the "dead-man" is to be placed. This hole should be at right angles to the direction of the rope. Procure a heavy piece of lumber 10 or 12 feet long and attach the tackles to the center of this. Drop it in the hole and drive rails or pieces of timber crosswise over it, into the sides of the hole. This is to prevent its jumping out. Then dig a ditch out of the hole to form a clearance for the tackle and prevent it from rubbing in the dirt.

A Simple Method of Raising U Bolt Through Saddle Block

There are few shovel runners who will not testify to the fact that when a U bolt breaks there are few clumsier and more awkward jobs than putting the new one in with the saddle block and dipper handles in place.

A simple way of getting around this back-breaking job is to drill the ends of the U bolt for small eye bolts, tap them, drop the two ends of a whistle chord through the holes in the saddle block, attach these ends to the eye bolts and hoist away.

An Efficient Method of Pulling a Shovel Ahead When Off the Track

A simple and efficient way to pull a shovel ahead when it is off the track is as follows:

Attach a chain or heavy rope to one link of the propelling chain and make the other end fast to a tie ahead of the shovel. When the propelling clutch is thrown in it will be found that the shovel will move whether the wheels hold or not. If this does not work a similar rope or chain may be attached to the other propelling chain.

A Suggestion to Reduce the Liability of a Shovel Getting Derailed

Whether chair ties or sections are used under a shovel, the liability of its getting off the track can be considerably reduced by tapering the top of the rail at each end. This can be most economically done in a blacksmith shop.

A. O. Sisson, Eveleth, Minn.

A Quick Method of Setting Valves on Reverse Valve Engines without Removing Valve from Chest

A rough but a rapid method of setting valves on reverse valve engines has been suggested to us. This makes it possible to set a valve quickly without having to take out the valve from the steam chest. This is, of course, a rough method but in the large majority of cases it is accurate enough for ordinary purposes.

After having removed the steam chest cover turn the engines over until the extreme travel is reached one way. With a tram or a pair of callipers, tram from the edge of the steam chest to any point on the valve steam. Center punch this point. Then turn the engines over to the extreme travel in the opposite direction and tram again from the edge of the steam chest to the valve steam. Center punch this point. Then take a center point between these two points thus marked and turn engine over till this center point is the same distance from either edge of the steam chest. This can be ascertained, of course, by means of the tram. Then calliper from the inside edge of the steam chest to the valve, shifting the valve until the distance from its ends to the steam chest are equal. Then tighten clips.

To Harden and Temper Steel

To one gallon of common fish or whale oil, take one pound each of beeswax and resin. Put into a kettle and heat till it comes to a boiling point, stirring it once in a while. When thoroughly mixed it is ready for use.

To harden in this solution, heat the steel till the scale rises a little, then immerse in the oil. When cool, heat over a clean fire till cherry red in the dark, says The American Blacksmith.

The foregoing, with a little practice, is recommended as one of the best compositions for hardening steel tools for use in cutting iron or wood, or even steel. Care must be taken as to the amount of resin in the oil, as resin hardens the steel, whereas beeswax and tallow toughen it. If a person prefer to temper in daylight, clean the steel or tool, polish it, and draw to a deep straw color, if for cutting iron or steel, and purple if for wood-cutting tools, such as plane irons, cutters, tec. With this composition, it is said, a better temper can be had for wood-cutting tools than with any other composition.

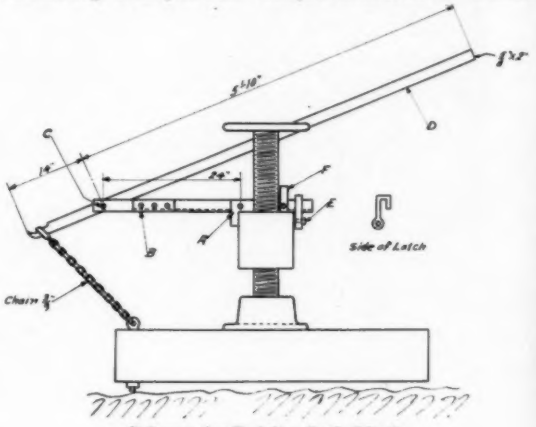
How to tell Steel from Iron

To test steel and iron, place a drop of Nitric Acid on steel and it will make a black spot. The harder the steel the darker the spot; if put on iron it will remain bright.

When drilling hard steel, use Turpentine instead of oil.

A Novel Way of Lifting Jack Blocks

We are indebted to Mr. Geo. T. Dowse, Supt., Lincoln Park Black Soil Plant at Lockport, Illinois, for the following interesting "kink" for lifting jack blocks. The lug "A", 14 inches long, is securely riveted to the fulcrum bar "B" made from bar iron $\frac{5}{8}$" x 2" x 4′-6" long, the fulcrum "C" being 24 inches from the forward edge of the jack arm. The jack block lever "D" is made



Scheme for Raising Jack Block.

from stock ⅝" x 2" and is 6'-6.' long, with hook end for engaging the chains attached to the block. This lever has ¾ inch hole drilled 14 inches from the hook end and is bolted to the forward end of fulcrum bar "B". A latch "E" is fastened to the rear side of jack arm and serves to hold fulcrum bar "B" when lifting block. A hook "F" is riveted to fulcrum bar "B" and holds down the jack block lever "D" while moving ahead.

Mr. Dowse states that this device has been used on his shovel for some time and has been found to be a very convenient and economical method of raising the jack blocks when moving ahead. It saves the time for looking up suitable wooden levers, the old "hickory pole" method, and is superior in every way.

The "Ten Demandments"

A business concern at Steveston, which is away up in Western Canada, has the following worldly wisdom conspicuously posted in their shop. While this may be a bit arrogative, it is nevertheless straight-from-the-shoulder.

First—Don't lie. It wastes my time and yours. I am sure to catch you in the end, and that will be the wrong end.

Second—Watch your work, not the clock. A long day's work makes a long day short, and a short day's work makes my face long.

Third—Give me more than I expect, and I will give you more than you expect. I can afford to increase your pay if you increase my profits.

Fourth—You owe so much to yourself you cannot afford to owe anybody else. Keep out of debt, or keep out of my shops.

Fifth—Dishonesty is never an accident. Good men, like good women, never see temptation when they meet it.

Sixth—Mind your own business and in time you'll have a business of your own to mind.

Seventh—Don't do anything here which hurts your self-respect. An employee who is willing to steal for me is willing to steal from me.

Eight—It is none of my business what you do at night. But if dissipation affects what you do the next day, and you do half as much as I demand, you'll last half as long as you hoped.

Ninth—Don't tell me what I'd like to hear, but what I ought to hear. I don't want a valet for my pride, but one for my purse.

Tenth—Don't kick if I kick. If you're worth while correcting you're worth while keeping. I don't waste time cutting specks out of rotten apples.

Why Dynamite Fails to Explode

The use by blasting men of the term "tamping" to indicate both the filling material for a drill hole and the process of compacting this filling, is often confusing. To avoid this confusion the Bureau of Mines has adopted the term "stemming" to indicate the filling material and restricts the term "tamping" to the process of compacting the stemming. This terminology is quite logical and, allows of clearness of statements without constant explanation of the language employed. It would be wise, we believe, for engineers to adopt this new terminology in their writings.

"Stemming" and "Tamping" in Blasting

We believe one reason why charges of dynamite sometimes fail to explode is that a strong enough detonator is not used. Gelatine powder loses its strength with age, and a cap that will answer the purpose with fresh sticks may not be effective with older ones. Not only is there great risk of accident from unexploded charges, but a weak cap is doubly poor economy, for even if all the powder be exploded, it is certain that the sticks furtherest away from the cap are merely burned up, and do no work whatever. And the grestest danger lies in the possibility that while to all appearances the shot has been successful, only the upper part of the charge has exploded and left the lower intact.

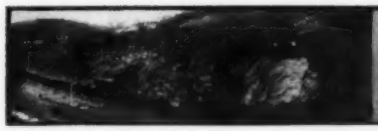
"Dont's" Governing Handling of Explosives in Mines

The Oliver Iron Mining Co. has issued the following rules for the government of its employees in the handling of explosives:

1. Don't forget the nature of explosives. By sensible treatment they can be safely handled.
2. Don't smoke while you are handling powder or other explosives, and don't handle powder and explosives so near a light that there is danger from the flame or sparks.
3. Don't have a lighted candle or open light in your hat or stuck in timber over the place where you are preparing powder or caps for blasting.
4. Don't throw or allow packages of explosives to fall violently.
5. Don't store blasting caps or electric fuses in the same box containing dynamite or powder.
6. Don't allow dynamite, powder, electric fuses or blasting caps to lie around loose in places where you are working.
7. Don't carry blasting caps or electric fuses in your pocket, and don't tap or otherwise investigate the same.
8. Don't attempt to withdraw a wire from an electric fuse.
9. Don't tighten a cap around a fuse by biting it with your teeth; use a cap crimper for that purpose. And don't attach the fuse to a blasting cap carelessly.
10. Don't attempt to remove blasting caps from boxes by inserting wire nails or any sharp instrument.
11. Don't leave dynamite, fuse or caps in a wet place.
12. Don't use a short fuse to hasten explosion, or with the idea that it is economical to do so.
13. Don't fire a charge to shake a hole and then immediately reload it, as the hole will be hot.
14. Don't do tamping with iron or steel bars or tools. Use only a wooden tamping stick with no metal parts.
15. Don't force a stick of powder with cap and fuse attached into a hole.
16. Don't fire shot before everyone is out of danger and protected from flying debris. Protect your supply of explosives also from danger from this source.
17. Don't hurry in seeking an explanation for a misfire. Take plenty of time before you approach a misfire.
18. Don't use frozen or chilled dynamite.
19. Don't thaw dynamite on heated stoves, rocks, bricks or metal, or in an oven, and don't thaw dynamite in front of, near or over a steam boiler or fire of any kind.
20. Don't put dynamite on shelves or anything else directly over steam or hot water pipes or other heated metal surface.
21. Don't place a cap or electric fuse in dynamite in any room where powder is stored.
22. Don't put dynamite into hot water or allow it to come in contact with steam.
23. Don't put dynamite in the sun, as all nitroglycerine compounds decompose when exposed to the direct rays of the sun for any length of time, no matter what the temperature of the air may be, and hence lose their efficiency.
24. Don't keep any blasting caps or electric fuses in any room where powder is stored.
25. Don't store fuse in a hot place, as this may dry it out so that uncoling will break it.
26. The following is the proper manner to attach a cap and fuse to powder: A hole is pointed downward in the side of a cartridge of dynamite and in this hole a cap with the fuse attached is inserted, the fuse being tied to the cartridge with string.

Speak What You Think

Speak what you think now in hard words and to morrow speak what to morrow thinks in hard words again, though it contradict everything you said today. The voyage of the best ship is a zig-zag line of a hundred tacks. See the line from a sufficient distance, and it straightens itself to the average tendency. Your genuine action will explain itself and will explain your other genuine actions. —*Emerson.*



Shots From The Firing Line

Alabama

J. J. Bryant is running a Model 60 shovel for the Ryan Company at Athens, Ala. Harry Stull is craning for him.

Way Down South

The Superintendent, big, bull-voiced and Northern, had, by necessity of an empty pocket book, taken charge of a Southern stone quarry where energy, if sold by the pound, might easily have been weighed in a butter scale. The day was hot. As a starter a blast had failed the night before. Then one of his numerous overseers, in an attempt to correct some of the faults of a craneman with five years experience, got the shovel off the track. Simultaneously he discerned that his hand-loading gang were "fuller" of moonshine than desire to work; and then word came from over the river that the crushers had "done broke down". With stoical repression he started towards them, when, upon reaching the bridge, he discovered it blocked by a whole train of cars which, like Ole, had "yumped".

Let it be explained here that he had taken that job under new owners who, like himself, needed the money. Also, that though he might have been a failure as a master of ceremonies, as a master of profanity he would not only have carried his own country but all Europe would have voted for him as well.

"Last call"! he announced; and launched into it.

"Would you-all take a little advice?" drawled a soft Southern voice. The Supt. turned to its owner. It was the overseer who had just derailed the shovel. The horror of shocked religious tendencies shown on his face.

"Well ——"

"You-all knows that King Solomon ——"

The boss bent a look at him and paused for breath. "Who the hell's he?" he roared.

"Why, he", continued the pious Kentuckian", lived back in the Biblical times. And he had lawge jobs to handle. But did it worry him? No, sah! For, you see", and the pious gentleman beamed at the Supt.", he let his ovahseahs worry about the details!"

For a second the air around there seemed to grow heavier and heavier with the surcharged impendency of an electrical storm. Then,

"Do you think that — — — — — ever run a stone quarry?"

—Reminiscences of Donald McGrew.

Arizona

The MacArthur Bros. Company have a contract near Miami, Ariz. for the excavation of about 600,000 cu. yards of soft conglomerate and rock for the Inspiration Copper Company. This latter concern are also building a railroad to their mines and mill. MacArthur Brothers are also building an extension of the Arizona Eastern Railroad to this point. They have just started a Bucyrus 70-C on this work and expect to buy another one very shortly.

California

Thos. Kinney, for a number of years shovel runner, died Sept. 6th at the U. S. Hotel in Los Angeles of Pneumonia. He was injured a short time ago by an automobile and seemed to be recovering nicely until Pneumonia set in. His age was 53 years. Very little is known here in regard to his relatives, except that he has a sister living in Pittsburg who has been notified. No definite arrangements have been made for the funeral. It is likely he will be buried here. Tom was well liked by his associates, was always a good fellow and has been a familiar figure on this coast for a number of years.

Robert Sherer, one of our big contractors, and his family have just returned from an 1800 mile trip in his touring car. Says he passed every machine he overtook except one, he thinks that fellow is going yet. We did not learn how many times he got pinched for speeding. They spent several days at Lake Tahoe and cam back feeling glad to be at home. Bob gained so many pounds on the vacation he had to have an extra leaf put in the Springs on his return. Please note that all contractors are not poor.

James Westbrook, Craneman, formerly on the McArthur Bros. job in Arizona, has severed his connections with the Boomers. Got married recently. Jim will have to dig now. The Excavating Engineer extends congratulations.

Jack Harriman is expected in Los Angeles from the Sharp & Fellows work. It is proposed to have a guardian appointed for him before his arrival to keep the Beach girls from stealing him.

J. H. Maxey, one of the Big Contractors registered at the Van Nuys Hotel, Los Angeles recently, is moving his outfit consisting of Dinkeys and Cars to his new job at Susanville, California. Jim says the outlook for work is good. About the hardest job he ever tackled is boosting Yuma as a summer resort.

John Anderson, master mechanic on the Los Angeles Aqueduct, started from Lone Pine for Mojave in his auto with the intention of visiting Los Angeles—had his Sunday clothes roped on the back of the machine in a suit case. On arrival all he had left was the handle still fastened to the rope. Fragments of the case, pajamas, manicure sets and the Sunday clothes were found covering a distance of 40 miles. The remedy for snake bites has not been recovered.

At 168 North Main St., Los Angeles, is located the U. S. Hotel, presided over by genial Johnny Althouse and is the Home of Steam Shovel Men. They are always sure of a welcome and of meeting their old associates. Here Steam Shovels are rebuilt and new records made with Bucyrus Shovels daily. The yardage moved does not tally well with the estimate at the end of the month. The hotel seems to be as big as ever. After the boys quit digging for the day and the hot boxes are looked after the proprietor gets out his buzz wagon—Here words fail: to continue, except to say B. S. Rowan, Thos. Kinney, Slim Dalton and J. S. Graney all got sore feet trying to find the foot brake, would be to cover the details of a joy ride and this would be indiscreet.

Here is the bunch that came into Los Angeles from the Aqueduct last week. Thos. Kinney, B. S. Rowan sometimes known as Joe Slim Dalton and J. S. Graney. They were in hard digging in front of the Post Office, time 2 A. M., got in the way of a joy rider. Slim was pulled from between the spokes of the front wheel uninjured. Rowan got mixed up with the Radiator. Graney seen 'em coming. Poor Kinney was in bed a week on a diet of Bologna, Rye bread and limburger cheese and the usual liquid nourishment for invalids. Strange to say none of them got pinched for obstructing navigation.

W. Allerton, engineer, and W. B. Hoyt, from the Aqueduct are registered at the U. S. Hotel, Los Angeles, this week. Haven't as yet heard of any disturbance in that end of town.

Scott Mitchell, Vice President and General Manager of the L. J. Smith Construction Co., and family and Mrs. L. J. Smith are registered at the Alexandria, Los Angeles. Mr. Mitchell is having his first vacation in two years. They have 32 miles of work on the Santa Fe near Seligman, Arizona.

Buck Tiernan, a Record Buster, is in Los Angeles from the Aqueduct. Buck is always good when he is broke and is good most of the time.

Billy Lowery, one of the old time runners, left Los Angeles for the north last night to work for the Wattis Boys near Wadsworth, Nevada.

Sharp & Fellows have been awarded a contract of about 150,000 yards by the Sante Fe filling in the Chino Bridge near Seligman. Their outfit is being moved from Gonzales, New Mexico.

Shovel No. 1372 Bucyrus 60-C has been at work for 22 months, most of the time double crewed, at the Los Angeles Highway Commission Quarry at Pecoima, California. The repairs to date consist of one "U" bolt and a broken friction band lug. Apparently the machine is good for a like period without any extensive repairs. This record is due largely to the boys who have operated it, who are as follows:

Day Shift—J. D. Vining, Engr. T. J. Littlefield, Craneman. R. M. Kirby, Fireman.

Night Shift—Ernest Ward, Engr. Joe Eckersley, Craneman. Howard Miller, Fireman.

Colorado

Kilpatrick Brothers have just been awarded a $50,000 contract by the Colorado & Southern Railroad for construction of a pipe line and two relief reservoirs. The grading for these reservoirs has been sub-let to Barker Brothers Company of Merino, Colorado.

Work Being Pushed on the Rio Grande

Electrification of the Rio Grande over Soldier Summit, which was proposed by President Bush contingent upon the ability of the company to obtain power at low cost has been abandnoned and the construction of a detour line of fourteen miles, which will reduce the grade to 2 per cent, has been begun.

The company expected to obtain its current from the Telluride Power Company, which has a station in Provo canon only a few miles distant from the crest of the Continental divide. It was figured that if the hydro-electric company could furnish the current at seven-eighths of a cent per kilowatt the electrification would not only be feasible, but would be far cheaper than the construction of the detour line. Engineers of the Westinghouse Electric Manufacturing Company who were on the ground estimated that the saving would approximate a million dollars, and they prepared plans for electric locomotives which would be able to haul the heaviest passenger and freight trains over the high grades without the necessity of splitting, as is done now.

When it came to the matter of obtaining current, however, the Telluride Power Company was unable to provide it at the low cost which the engineers for the railroad company felt was necessary. The railroad company then turned its attention to the cost of installing a hydro-electric plant of its own but this it was found would require a larger amount of money than would the building of the detour line and in the interest of economy the latter was decided upon.

Work will be pushed on the construction work as long as possible this summer and fall but the new line will not be in operation probably until next May. The reduction of the grades from four to two per cent will enable the company to run its trains through without breaking and effect a saving, which Chairman Jeffrey of the executive committee estimates at about $600,000 a year. This is largely due to the decreased amount of coal consumed and to the lessening of the wear and tear on the equipment. The latter item has been a serious one for years and the shops have been constantly filled with engines and cars that have been damaged in making the shift from one side of the summit to the other. —*Ry. Record.*

Florida

Progress on the Gulf, Florida & Alabama Railway

The Gulf, Florida & Alabama Railway, being constructed by Megargel & Co., will put about 90 miles of line in operation in October, at which time one of the piers at Pensacola will be ready for use. At present, about 65 miles are being operated under lease to private interests, the revenue from such operation, it is reported, being in excess of the interest charges on the bonds outstanding.

The road from Pensacola to connections with the Southern Railway at Pine Hill, will probably be opened early next year, making a continuous line of 137 miles and connecting the Birmingham mineral districts with deep water. Contracts are now being let for the extension of the road north of Local.

The Gulf, Florida & Alabama will ultimately operate between Pensacola and Jasper, Alabama, about 300 miles. —*Ry. Record.*

Illinois

A veteran in the management of steam shovels, Mr. Ed. Stoles, is now engaged on work being done near Lemont, Ill., by The Great Lakes Dredging Co.

Mr. Stoles has served this concern for more than twenty years, a record to be proud of and is now superintendent of the Great Lakes plant located at Lemont.

J. W. Guthrie is engineer and Edward Engea is craning a Vulcan shovel on the Peoria & St. Louis Ry. at Pekin, Ill.

Indiana

Joseph Flannery is craning a 70-C Bucyrus shovel for Eyre-Shoemaker at Neutan, Ind.

Kansas

Pittsburg—The new 150 ton Bucyrus steam shovel purchased by the Pittsburg-Scammen Coal Co. is all set up complete and in working order, and is being moved by its own power to the coal field, a mile up the county road, where it will be put to stripping without delay. Harry Miller of Scammen will have the active management of the field, about 1½ miles south of Scammen.

Pittsburg—The Sternberg Construction Co. of Pittsburg and Kansas City who have a contract to strip and load coal for the J. R. Crowe Coal Co. north of Weir City, have started their steam shovel stripping after being shut down for several weeks.

Alston—The W. W. Patterson Coal Co. are now stripping coal about 12 miles north of Pittsburg on the Firsco Railroad with a Model 250 Marion steam shovel, after a much needed rest on the part of the steam shovel.

Pittsburg—E. P. White of the firm of Smith, Scott & White Coal Stripping Contractors is now located here with an office in the Globe building. This firm is in shape to take contracts for coal stripping and loading on railroad cars.

Arcadia—The Haynes Coal & Mining Co. of this city started their 95 ton steam shovel stripping coal about the 7th inst. in their coal field at Ardath about 3 miles south of Arcadia

on the Kansas City Southern R. R. Their stripping will average about 16 feet in depth with a fine bed of coal under it. The Haynes boys are hustlers and we predict success in their enterprise.

Pittsburg—The Bucyrus Company of South Milwaukee, Wis., have sold six of their coal stripping steam shovels for use in the Pittsburg district within the past four months. Three of these shovels are now being installed. The others will follow in short order. This Company will continue to build several sizes of coal stripping shovels and are prepared to make prompt shipment on future orders.

Pittsburg—That the durability and excellence of the Modern Steam Shovel greatly exceeds those of earlier date is becoming generally known as is evidenced by a letter received from the C. H. Markham Coal Co., who are operating a 150 ton Bucyrus Revolving Steam Shovel of the latest model, stripping coal about 12 miles north of Pittsburg Kans. Mr. Markham says that he has operated his shovel continuously since April 1st a period of 4½ months and has had no expense for repairs excepting a hoisting cable, and to sharpen the dipper teeth. which demonstrates the excellence in the construction of Bucyrus steam shovels.

Leavenworth—McGuire and Stanton, General Contractors are starting on a job of rip rap for U. S. Government on the Missouri River at Missouri City. There will be about eight months work.

Topeka—T. L. Campbell R. R. Contractor of this city has been awarded 25 miles of grading out of Creston, Iowa, on a new Steam Railroad being built to be known as the Creston, Winterset and Northwestern.

Pittsburg—The work of setting up two of the new 175 ton Bucyrus steam shovels, near Wier City for Smith- Scott & White, is progressing favorably and without delay. Frank Wilkinson, the competent erecting engineer of the Bucyrus Co. has charge of the work. These shovels will be used for stripping overburden in the coal field, which ranges from 14 to 32 feet deep, under contract with the Central Coal & Coke Co.

Pittsburg—The Bucyrus Company is having numerous inquiries for information regarding their coal stripping steam shovels. As it is becoming well known that they are the most successful type now in the field, parties figuring on going into coal stripping may obtain full information by writing the Company's General Sales Office at No. 622 McCormick Building, Chicago, Ill.

Maryland

John A. Downing is operating a Little Giant Vulcan shovel for the Willis Fox Company at Rowland Park, Baltimore, Md.

Massachusetts

Vivian Price, Jr., who until recently has been operating a Bucyrus shovel for Lewis J. D'Isa at Iron River, Mich., has moved to Massachusetts, owing the fact that the former contractor was forced to close down his night shift because of lack of labor. He is now operating a 70-C Bucyrus shovel at Becket Center for the Western Massachusetts Construction Company.

Michigan

A. J. Medley is operating a 65 ton Bucyrus Shovel for Louis J. D'Isa on his Chicago, Milwaukee & St. Paul contract near Iron River, Mich. Mr. Medley has been operating shovels for H. S. Kerbaugh for the past year or so.

Fred Kane, who until recently has been firing a 95 ton Bucyrus for the Sandusky Portland Cement Company at Dixon, Ill., is firing a 65 ton Bucyrus shovel for Louis J. D'Isa at Iron River, Mich.

Minnesota

F. H. LaNore is Yardmaster for the Oliver Iron Mining Company at Hull Rust Mine, Hibbing, Minn.

George Geary is watchman for P. T. Clifford & Son on their contract between Smithville and Wooster, Ohio.

Duluth—The high loading record for a steam shovel was broken recently at the Leonard mine pit in the Chisholm district when one hundred and eight steel ore cars were loaded by an Atlantic steam shovel in a ten hours shift. The cars were each 45-tons capacity and the day's work aggregated 8–100 tons of ore.

This is the highest record made by any mine on the entire Mesable range, the nearest approach to it being held by the Coleraine district when 160 steel cars were loaded in the same period.

Duluth—The Arthur Iron Mining Company of Duluth, which handles the Great Northern ore properties, has awarded contracts for two more big pieces of stripping on the Mesabbe range. Butler Bros. well known stripping contractors, secured both contracts. The larger of the contracts calls for the removal of about 3,000,000 cubic yards from the company's property adjoining the Whiteside mine in the Buhl district. The other contract is for the stripping of the company's property near the North Uno mine, in the Hibbing district and involves moving about 500,000 cubic yards. Butler Bros. purchased a 100-C shovel recently through the Duluth office of the Bucyrus Company to use on these stripping propositions.

Duluth—The many friends of Captain Harry Roberts, of Duluth, Minn., who has been passing the summer at his cottage at Solon Springs, Wis., and who has been seriously ill for sometime past, will be glad to learn that he is now able to be around again and is on the road to complete recovery.

Duluth—Captain Thomas Nichols, who has been employed for twelve years by Pickands, Mather & Company, Cleveland, on the Mesabbe range, will have general supervision of a new property which will be developed by the Cascade Mining Company, on the Marquette range.

Duluth—William Brown, of Hibbing, Minn., was elected president of the Iron Mountain Co., Duluth, Minn., at the annual meeting recently. The Company is developing property on the Cuyana range.

Duluth—I. S. Roe, formerly superintendent at the Barrows mine of the Virginia Mining Company, on the Cuyana range, has been transferred to Crystal Falls, Michigan, where he will take charge of the Carpenter, Monongahela and Ravenna mines.

Duluth—James A. MacKillican, who has been city engineer of Escanaba, Michigan, for two years, has accepted the position of assistant superintendent of the Merden Iron Company, Hibbing, Minn., and assumed his duties on Sept. 1. He is a graduate of the Michigan School of Mines, at Houghton.

Missouri

The Foundation Company has completed the foundation work for the Railway Exchange Building, St. Louis, covering an entire city block. The work included 29 pneumatic caissons and 51 piers of open method. Besides just starting the work on the Scotia Dam, in the Mohawk River, the company is doing the foundation work for the Kinney Building in Newark, N. J.

Kansas City—Norton Brothers Contractors are digging a cellar with a revolving steam shovel for a new building, corner of 10th and Grand Ave.

Kansas City—Fitspatrick and Coffey have a grading job corner of McGee street and Gilham road. They are operating a revolving steam shovel on the work.

Kansas City—McFiernan & Holpin Construction Co. are making good progress in cutting through McGee Street for the city, and have about 5 months more work to complete the contract.

Kansas City—There are about 2 million yards excavation still to be done at the new terminal R. R. grounds, which will take some time to finish.

Moberly—Grommet and Johnson R. R. Contractors of St. Louis are making dirt fly on a contract awarded them some time ago on the Wabash. This work is double tracking from Moberly to Huntsville, Mo.

Excelsior Springs—W. M. Spencer, R. R. Contractor of Kansas City os taking out a big cut on the K. C. St. Jo. & Excelsior Springs Electric Ry., which he expects to finish in about 2 months. He has also a contract to ballast the road with crushed stone and is working double shift in loading the rock with a 70 ton Bucyrus steam shovel.

Kansas City—M. T. Bobb, representative of the Western Wheeled Scraper Co., office in the Oscar-Leslie building, reports their business very good in the sales of Contractors' Equipment.

Montana

The illustration herewith shows an 85-C Bucyrus Shovel owned by E. S. Hill & Co. in course of being moved from Swift, Montana, 9 miles across country. E. S. Hill & Co. have a subcontract and Winston Bros. on The Chicago, Milwaukee & Puget Sound Ry. for a branch from Butte to Great Falls, Montana. The shovel was moved nine miles under its own power in 7½ days. Although the country was prairie, the going was very rough at times it being necessary to cross several deep ravines or "coolies". Eleven men and four horses were used.

The shovel travelled on 30 foot sections of track. The rails were carried around from the rear of the shovel by horses, one horse for each rail. The two other horses following with the ties and bridles. Despite the difficulties met with, the shovel never left the rails once. The work was under the supervision of Mr. Philip Rouse, the Bucyrus Co's. Erecting Engineer.

The shovel is being used at the present time for making a heavy fill across a "cooley" 120 feet deep and about 400 feet wide.

New Jersey

R. Arner is operating and M. L. Anderson is firing a new 14-B Bucyrus shovel for the Miles-Tighe Company at Flagtown, N. J., on the Lehigh Valley R. R. W. N. Steivers is Superintendent. Mr. George Williams has just completed setting up and testing the machine.

New York

J. J. Dorgan is setting up and starting a 14-B Bucyrus shovel for James McGaffery & Son at Mount Vernon, N. Y.

W. McKee is Superintendent for Richards & Gaston at Poughkeepsie, N. Y.

A Perfectly Good Reason

Frederick Tench, of Terry & Tench, Inc., says he was so busy he just couldn't get away for the Goodwin outing on July 17th. Now we learn that he has secured the contract for the steel erection in the new Baltimore Hotel, to be built by the New York Central Railroad as a part of the Grand Central improvements. There are 13,500 tons of steel in the job, so it was worth while sticking close to until landed.

W. C. Brown is operating and A. E. Potter is craning a 70-ton Bucyrus shovel for Richards & Gaston at Poughkeepsie, New York.

W. J. Grady is Engineer on the O'Brien Construction Company's new 70-C Bucyrus on the Cntral of New England working near Highland, N. Y. Joe Reilly is firing for him. Wm. Walsh is Superintendent of this work.

North Carolina

Claud Godwin is operating a 90-ton Atlantic shovel near East Durham, N. C.

Railway Construction in North Dakota

North Dakota's railroad map will undergo great changes within the next few months when 1,406 miles of new road, either under course of construction at the present time, or on which work is to be commecned at an early date, is completed.

Taking into consideration the size of the state, its population, and the amount of railroad mileage it already has, the new mileage that is being laid in North Dakota easily places this

commonwealth at the head of all states in the Union from the point of rail construction for this year.

At present the greatest interest is centered on the new line of the Minneapolis & St. Louis railroad, which will extend from a point on the boundary line south of Rutland, Sargent county, to the north boundary line of the state, running in a northwesterly direction. This line will form a connecting link for the road to the grain fields of the Canadian Northwest.

The new railroads under construction and lines which have been approved by companies follow:

Great Northern—From Fargo, Cass County, to Surrey, Ward County, crossing Barnes, Griggs, Foster, Eddy, Wells, Pierce and McHenry, 206 miles; from New Rockford, Eddy County, to Shafer, McKenzie County, crossing Wells, Sheridan, McLean, Dunn and McKenzie, 204 miles.

Northern Pacific—From Mandan to Stanton and Dunn County, along Knife River, crossing Morton, Mercer, Oliver and Dunn Counties, 125 miles; from Pingree to Wilton, crossing Stutsman, Kidder, Burleigh and McLean Counties, 84 miles.

Sault Ste. Marie—From Fordville, Walsh County, to Drake, McHenry County, crossing Walsh. Nelson, Ramsey, Benson. Pierce and McHenry Counties, 170 miles; from Ambrose, Divide County, to Montana boundary line, 25 miles; from Plaza to McKenzie County, crossing Mountrail and McKenzie County, and probably extending into Billings (est.) 100 miles.

Minneapolis & St. Louis—From boundray line, south of Rutland, Sargent County, to north boundary line, in northwesterly direction, touching Ransom, Stutsman, Foster, Wells, Pierce and Bottineau (est.) 300 miles.

Midland Continental—From Jamestown in northeasterly direction, crossing Stutsman, Griggs, Grand Forks, Walsh and Pembina Counties, 192 miles. Total new mileage, 1,406 miles.

—*Railway Record.*

Oklahoma

Tulsa—The new State Coal Co. of this city is operating two big coal stripping steam shovels, one at Broken Arrow 14 miles east of Tulsa and one at Collinsville 18 miles north. These are the first successful coal stripping shovels put in operation. They were designed by Mr. W. S. Russell now mechanical engineer for the Bucyrus Company, the Broken Arrow shovel has been in operation two and one-half years digging hard blue shale and has never had a break down, it has a 60 foot boom, 2 yard dipper and weighs 135 tons.

Pennsylvania

The Pittsburgh & Shawmut will build a new line of railroad 100 miles long, from Knoxville to Freeport, Pa., and probably a branch from North Butler, Pa., the total expenditure to be $30,000,000.

J. A. McDermott is Superintendent on Reiter-Curtis & Hill's contract on the D. L. & W. Ry. at LaPlume, Pa. A. E. Swab is Master Mechanic at this point. The four Bucyrus 70-ton shovels on this work are being operated by W. Fowler, Mieik Daley, Alec Walters and A. Culp. M. M. Staples is operating a Marion Model 30 shovel for the same Company at Scranton, Pa.

E. N. Brubaker who until recently was with H. S. Kerbaugh at Sand Patch, Pa., resigned his position when the tunnel job was finished and now may be found at his home, 6516 Frankstown Ave., E. E. Pitsburg, Pa.

Reading—Mr. Richard Kropf formerly chief shovel man for the Philadelphia & Reading Coal & Iron Co., at their Good Spring Colliery, has recently been promoted and is now Asst. Outside Foreman at the company's Pine Knot Colliery.

F. H. Clement & Company are operating 40-R and 70-C Bucyrus shovels at South Bethlehem, Pa. The 70-C shovel was recently tested by Mr. George Williams. The contract consists of excavating for open hearth foundations for Bethlehem Steel

Company. The 40-R shovel is run by John Daly, Engineer, and John Coyle, Cranesman. Tom Daly is operating and William Schroeder craning the 70-C. Mr. E. T. Gallagher is General Manager of this Company.

Rhode Island

Echoes from the O'Brien Job

Ach du liber Gott in Himmel,
Vat an awful noise is dat?
Go to bett you foolish childer,
Dat iss Berrie at der bat.
He iss batting dat old shoffel,
In a most ungottly way,
He iss haffing lots of truble,
Truble here has come to stay.
R-r-ripping, r-r-roaring, enchines snor-r-ring,
Trowing up great clouts of smoke,
Berrie fretting, red-faced, sweating,
Holy Smoke, der chain iss broke!
Pitmen staring, cranesman swearing,
"Here you hunky get dat rope,
Stop your talking! don't stand gawking!
Lifely du verichter mope!"

—*J. Elliot.*

South Dakota

Engineer John McCoy, who has been operating the Class 24 Bucyrus for the day shift has accepted a position in Sacramento, California, and has been replaced by John Knott, former operator on J. R. Swigart's Class 14 Bucyrus.

Elssworth-Klaner have finished their contract and have moved their machine.

The Morris, Shapard & Doughtery work between Andover and Groton, S. D., is rapidly nearing completing. The Class 20 Bucyrus drag line excavator has completed a small fill west of Andover and the Class 24 Bucyrus has just been moved to a new cut-off recently decided upon two miles east of Andover. The

contractors' camp will be moved one mile west of Andover and Mr. O. O. Ogden, Supt., and George Malory book-keeper will be residents of the Andover end of the work in the future much to the regret of the Silo House and other west end residents.

J. R. Swigart has finished a 150,000 yard contract, moving this amount between May 17th and July 30th. His Class 14 Bucyrus will probably be taken to Milwaukee or Chicago and given a thorough over-hauling.

Tennessee

Nashville—Mr. Valentine Mennay reports that work is going nicely on the L. & N. Ry between Nashville and Lewisburg. The Pennsylvania Contracting Co's., 70-C Bucyrus shovel made the record output for the month.

Wisconsin

Contractor John Marsch's Bucyrus Shovel Cutting Down Grade and Straightening the Chicago, St. Paul, Minneapolis & Omaha at Eau Claire, Wis. During September 89,000 cubic yards of Rock and Earth were Removed. E. K. Berie, Engineer; Oscar Sackerson, Walking Boss.

Utah

D. S. Gerow, who has made his home and headquarters in Denver for about two years, has taken a contract under Kilpatrick Brothers for Bridge Filling and Grading, on the Tintic Branch of the D. & R. G. Railroad in Utah, near Laguna. He has moved his 70-ton Bucyrus, and 2-18-ton Vulcan Locomotives, with requisite number of dump cars from Cheyenne, Wyoming, where he recently completed a contract for furnishing ballast for the Colorado & Southern Railroad.

Kilpatrick Brothers of Beatrice, Nebr., and Denver, Colorado, have moved one of their 70-ton Vulcan Steam Shovels to Kyune, Utah where it will see some good hard service on double track work on the D. & R. G. Railroad between Kyune and Castle Gate, Utah.

Brazil, S. A.

A. M. Dodd who is operating a 45-C Bucyrus shovel on the Sorocobana division of the Brazil Railway at Sao Paulo, Brazil, writes us as follows:

"I am at present operating a 45-C Bucyrus shovel for Brazil Ry. Company on Sorocobana Div. and am glad to say it is proving a success.

"This was the first shovel in this district and was mostly an experiment. Since noting the operation of this shovel the Company has ordered another. Which is very gratifying.

"This road is a one metre gauge and naturally I was a little nervous at first, but we have experienced no trouble whatever from that source, in fact we have had no trouble at all. The greatest inconvenience has been with the labor not being able to speak the language, however I find them willing workers and at present have them well organized.

"My present work is building freight yards and filling over a marsh".

Canada

James O'Hern, an old Bucyrus Shovel Man, is operating a Class 45 Atlantic type shovel for the Grand Trunk Pacific Ry., in their gravel pit at Hinton, Alta. He is making excellent progress with this machine, his average day being 150 convertable flat-cars of about 45 cu. yards capacity each in a 12 hour day. Mr. R. M. Halpenny is Superintendent in charge of this work.

Mexico

Owing to the activity of bands of revolutionists in the state of Chihuahua, Mexico, the construction of the new railroad that is to run from Pearson to Pacheco has been suspended temporarily. The completed portion of the road connects at Pearson with the Mexico Northwestern and, while it is being constructed by other interests, it will be operated, it is said, as a part of that system. Besides interfering with the construction of this road the unsettled conditions in Western Chihuahua have practically tied up the Mexico Northwestern with the exception of the division that runs between Chihuahua and Madera. Very little traffic is being handled by that part of the road that is still in operation. The Mexico Northwestern is owned by a syndicate of British investors headed by Dr. F. S. Pearson of New York and London.

MAIL FORWARDING DEPT.

Field men may have their mail addressed in care of THE EXCAVATING ENGINEER and it will be promptly forwarded. Should no forwarding address be on file the names of those for whom we have mail will be published in this department.

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Mason, Fred. B.—Letter and package.
Wilson, Dick—Post card.

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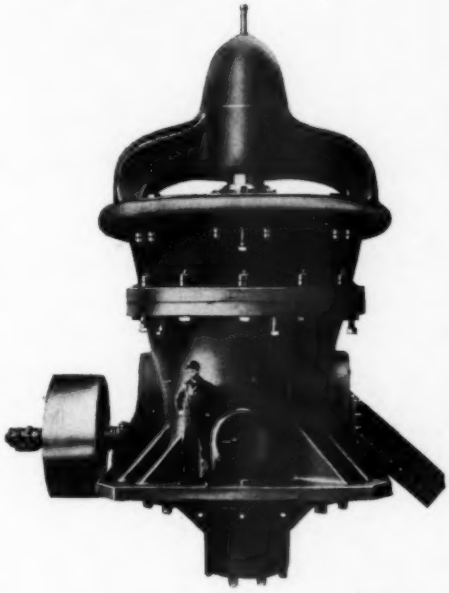

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By means of a well designed system for handling their material they made this record in placing the concrete.

Gravel was hauled 60 miles on scows, and unloaded onto the wharf. Grab buckets then delivered to two travelling hoppers on the conveyor, which in turn carried it up to the mixing towers. This job was completely described in Labor Saver No. 36. Did you get your copy?

Lowest Cost Per Ton-Foot

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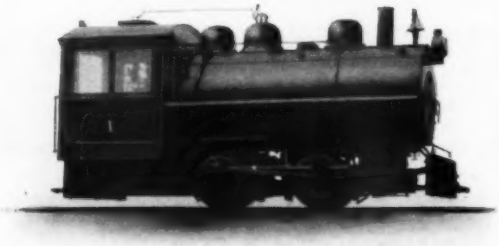

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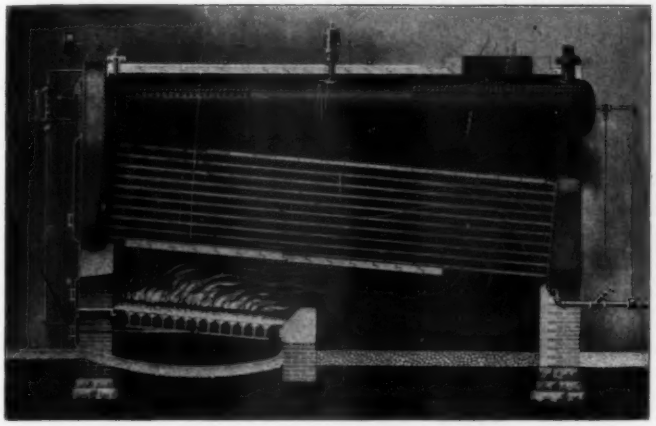

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Two 45-ton Vulcan Steam Shovels mounted on railway wheels, with 1½ yard dipper.

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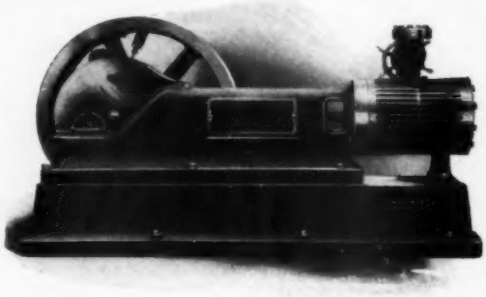

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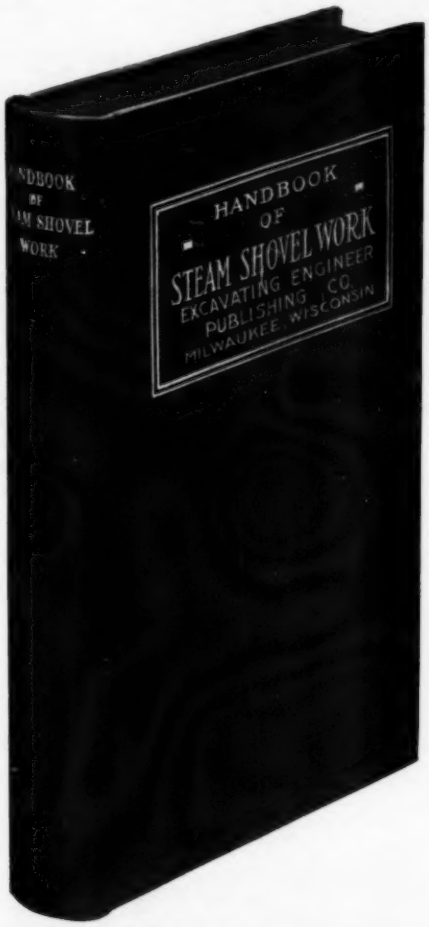

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